Gartner Lee Associates Limited

Open File Report 86-4

GRANULAR AGGREGATE RESOURCES OF THE KEDGWICK—SAINT-QUENTIN—GRAND RIVER AREA (N.T.S. 21 N/16, 21 O/5, 11, 12, 13, 14) NORTHWESTERN NEW BRUNSWICK

by

A. J. COOPER
GARTNER LEE ASSOCIATES LIMITED
in conjunction with
THREE-D GEOCONSULTANTS LIMITED

Canada-New Brunswick Mineral Development Agreement
Entente Canada-Nouveau-Brunswick L'Exploitation Minérale

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New Brunswick

Hon. Malcolm N. MacLeod, Minister

1986

GRANULAR AGGREGATE RESOURCES
OF THE
KEDGWICK—SAINT-QUENTIN—GRAND RIVER AREA
(N.T.S. 21 N/16, 21 O/5, 11, 12, 13, 14)
NORTHWESTERN NEW BRUNSWICK

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Copies available by contacting:

Mineral Resources Division
Dept. Forests, Mines and Energy
P.O. Box 6000, Fredericton
New Brunswick E3B 5H1

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Author: A.J. Cooper (Gartner Lee Associates Limited) in conjunction with Three-D Geoconsultants Limited

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GRANULAR AGGREGATE RESOURCES OF THE KEDGWICK-SAINT-QUENTIN-GRAND RIVER AREA NORTHWESTERN NEW BRUNSWICK

N.T.S.	21 N/16	WILD GOOSE LAKE
N.T.S.	21-O/5	GRAND RIVER
N.T.S.	21-O/11	KEDGWICK
N.T.S.	21-O/12	GOUNAMITZ RIVER
N.T.S.	21-O/13	STATES BROOK
N.T.S.	21-O/14	MENNEVAL

BY
A.J. COOPER
GARTNER LEE ASSOCIATES LIMITED
in conjunction with
THREE-D GEOCONSULTANTS LIMITED

PROJECT NO. 85-125

JANUARY, 1986

March 25, 1986.

M. Jacques J. Thibault,
Department of Forests, Mines and Energy,
Mineral Resources Division,
Soils and Minerals Laboratory,
College Hill Road,
P.O. Box 6000,
Fredericton, New Brunswick,
E3B 5H1.

Dear M. Thibault:

Re: Granular Aggregate Resources of the Northwestern New Brunswick Map Area (GLAL 85-125) - Final Report

We respectfully submit our report describing the aggregate resources of this area.

The work was carried out by the geological staff of Gartner Lee Associates Limited and Three-D Geoconsultants Limited under the direction of Mr. A.J. Cooper, M.Sc. All known pits plus accessible deposits were field checked and 97 are described in detail. In addition, 48 supplementary observations were recorded to describe noteworthy geological sites encountered during mapping. Many remote deposits of outwash and alluvial origins have also been outlined on the maps with the aid of airphoto interpretation. All deposits, pits and supplementary observations are recorded on the Granular Aggregate Resource maps found in the pocket at the back of the report.

It has been a pleasure to present you with these results and we thank you for allowing us to be of service.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

John F. Gartner, P.Eng.,
Consulting Engineering Geologist,
Project Director.

AJC:jcm

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ABSTRACT

The study area, in northwestern New Brunswick, includes the following N.T.S. map areas: Wild Goose Lake (21 N/16), Grand River (21-O/5), Kedgwick (21-O/11), Gounamitz River (21-O/12), States Brook (21-O/13) and Menneval (21-O/14). A total of 38.3 million m^3 of granular aggregate material has been identified. Most of these deposits are composed of ice-contact (62%) or of glaciofluvial outwash (32%) material. Many smaller deposits have been noted as potential local sources of granular aggregate. A high percentage of unsound lithologies limits the quality of these resources.

RÉSUMÉ

La zone d'étude, dans le nord-ouest du Nouveau Brunswick, comprend les secteurs suivants de la carte N.T.S.: Lac Wild Goose (21 N/16), Grand River (21-O/5), Kedgwick (21-O/11), Rivière Gounamitz (21-O/12), States Brook(21-O/13) et Menneval (21-O/14). On a identifié un total de 38,3 millions de m^3 de matériaux d'aggrégats granulaires. Ces dépôts sont constitués en majeure partie de matériaux de contact glaciaire (62%) ou de rejets glacofluviaux (32%). On a relevé de nombreux dépôts plus petits qui peuvent constituer des sources locales d'aggrégats granulaires. La qualité de ces ressources est limitée par un pourcentage élevé de matériau lithologique de qualité insuffisante.

1.0 INTRODUCTION

1.1 LOCATION AND ACCESS

The study area consists of all or major parts of six 1:50 000 scale topographic sheets situated in the northeastern corner of New Brunswick. It comprises the majority of the land between Edmundston and Campbellton northeast of Highway 17 -- approximately 5000 km^2 in area.

Major access is via Highway 17 which trends southwest to northeast across the lower part of the study area. A gravel highway connects Saint-Quentin to Mount Carleton Park and Bathurst to the southeast. Occasional municipal or secondary highways are located near Kedgwick and Saint-Quentin but the majority of the area is serviced only by forest access roads. These roads are founded on weathered bedrock, are well constructed and durable and have remained serviceable for many years, even in inactive areas. Scattered parts of the Menneval sheet and the eastern half of the Kedgwick sheet contain few roads but the remainder of the area is well covered by the lumber road access network. Access to lumber roads south of the Gounamitz River is controlled by J.D. Irving Limited.

The study area is bounded by latitudes 48°00'/48° 45' North and by longitude 67°00'/68°23' West.

The following map sheets cover the study area.

Wild Goose Lake	NTS	21 N/16
Grand River	NTS	21-O/5
Kedgwick	NTS	21-O/11
Gounamitz River	NTS	21-O/12
States Brook	NTS	21-O/13
Menneval	NTS	21-O/14

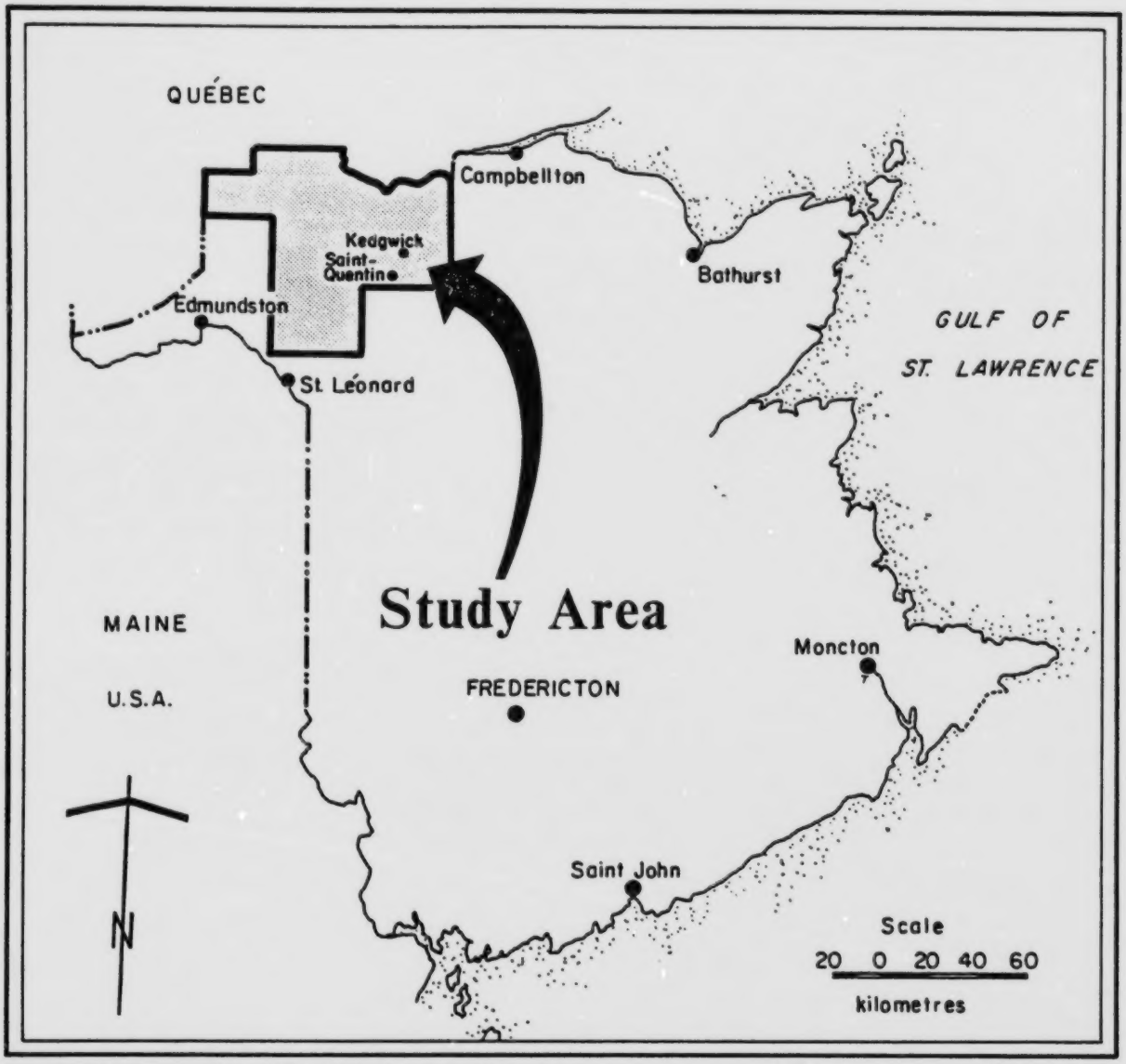


Figure 1

LOCATION OF STUDY AREA

1.2 PREVIOUS WORK

The bedrock geology of much of the study area was mapped and described in detail by St. Peter (1978). Small site specific investigations were carried out on a marl deposit near Saint-Quentin by Kingston (1976) and a small study of the bedrock and Quaternary geology of the town of Saint-Quentin by Davies and Seaman (1982).

The first major study of the Quaternary geology of the area was carried out by R.C. Gauthier for the Geological Survey of Canada. His work was released in a series of progress reports and culminated in the release of his maps (Gauthier 1982) and accompanying report (Gauthier 1983) covering much of the northern New Brunswick region. Gauthier's work provided the basis for compilation of the Quaternary geology of the area by Pampton et al. (1984). Brief reference to the geology of the area was made by Jones (1961) and Kite et al. (1982). Van Groenewood and Ruitenberg (1982) published a forest site classification system with direct relevance to the area. Langmaid et al. (1980) and Dubé (1982) have conducted soil surveys for major portions of the southern part of the study area.

A sequence of aggregate mapping projects has been carried out in adjoining study areas. Brinsmead (1979) and Finamore (1979) mapped the areas to the east, Thibault (1979) studied the areas to the west around Edmunston, and also the area to the south (Thibault 1980). The most recent publication is by Thibault (1985) which covers the area south of Kedgwick and east of Grand River.

1.3 PRESENT STUDY

Gartner Lee Associates Limited was commissioned by the Mineral Resources Division of the Department of Forests, Mines and Energy on September 12, 1985 to carry out a Granular Aggregate Resources Inventory of the Kedgwick - Saint-Quentin - Grand River area in northwestern New Brunswick. The study was funded under the Canada - New Brunswick Mineral Development Agreement.

The study was part of a province-wide survey to provide basic information on the distribution, extent, thickness and quality of granular aggregate resources. Previously published works and unpublished New Brunswick Department of Transportation data were obtained and compiled. Field work involved the examination of readily accessible natural and man-made exposures, supplemented by the interpretation of stereoscopic aerial photographs. Reserve estimates are based on field observations. A detailed explanation of the map and pit descriptions occurs in Appendix C.

1.4 PHYSIOGRAPHY AND DRAINAGE

The study area includes parts of the Edmundston Highlands and the Chateau Uplands (Rampton et al. 1984).

The Edmundston Highlands comprise the Wild Goose Lake, States Brook and northwest portion of the Gounamitz River sheets and correspond closely to the area underlain by the Temiscouata Formation siltstones. The Highlands exhibit a fairly rugged topography with relief ranging to 300 m in many areas. Most of the relief occurs as a result of deeply cut V-shaped river valleys. The upper portions of the hills are the remains of a broad peneplain of Cretaceous age and the deeply incised valleys were cut during a period of uplift in Triassic time. More

recent (glacial) events do not appear to have altered the physiography of the area significantly.

Drainage in the Highlands is via a series of parallel streams flowing toward the southeast. These streams include the Patapedia, Kedgwick and Gounamitz Rivers. These waterways join the Restigouche River which then flows northeastward along the New Brunswick border toward Chaleur Bay.

The remainder of the study area is part of the Chaleur Uplands. "The Chaleur Uplands consist primarily of a plateau, locally dissected near major streams and interrupted by clusters of hills. The uplands, although generally forming a plateau well above sea level, are lower and less rugged than adjacent ground in the Edmundston Highlands ..." (Rampton et al. 1984, p. 70). Relief is commonly in the order of 100 m and rolling hills are scattered throughout the region. Locally valleys such as the Jardine Brook and the Upsalquitch River have well developed V-shaped valleys.

Drainage in the Chaleur Uplands is dendritic and many small brooks flow northwestward toward the Restigouche River, southwestward via the Grand River, and eastward and northward via the Upsalquitch River system.

1.5 ACKNOWLEDGEMENTS

The author wishes to thank those individuals who assisted with the study. M. Jacques Thibault of the Mineral Resources Division provided valuable discussions and advice on certain aspects of the study both in the office and the field. Mr. Reg Wilson and Mr. David Keys of Three-D Geoconsultants in Fredericton conducted background research and carried out the grain size and petrographic analyses. Field mapping and

sampling were carried out by Mr. Angelo Babaris and Mr. Andrew Cooper of Gartner Lee Associates Limited. Compilation of data, drafting and report writing was completed by Mr. Cooper and the Gartner Lee Associates Limited staff. Mr. John Gartner reviewed the work and edited the report.

Field work was greatly facilitated by the assistance of the Fraser Companies Limited and the J.D. Irving Limited.

2.0 GEOLOGY

2.1 BEDROCK

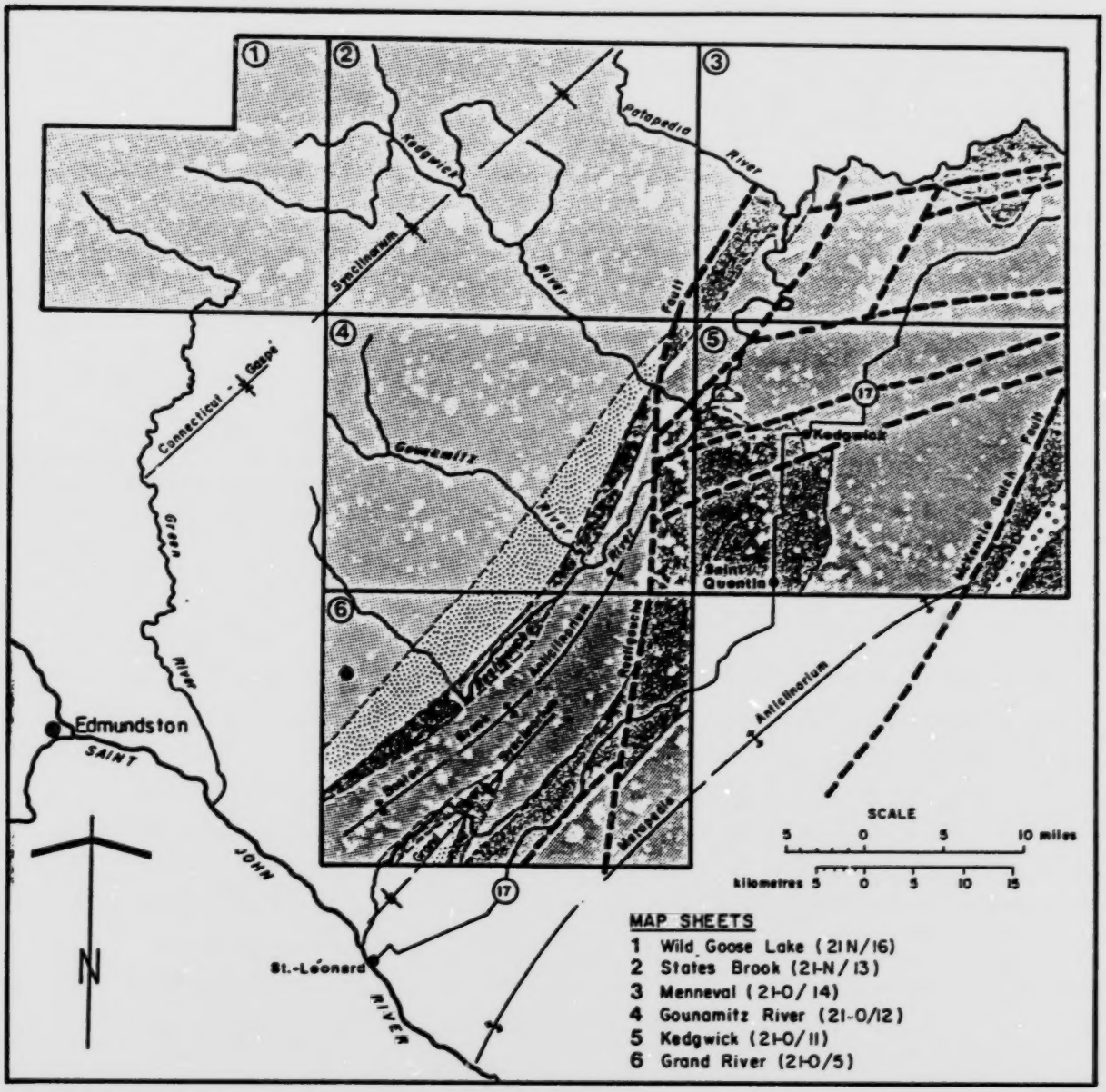
The study area is largely underlain by a sequence of folded and faulted fine grained clastic sedimentary rocks ranging in age from Ordovician to Devonian. The major rock types are siltstone and greywacke. Less abundant rocks are slate, feldspathic, quartzose, and calcareous sandstone, conglomerate, shale, argillaceous limestone and rhyolite (one occurrence).

The distribution and stratigraphy of bedrock units is presented on Figure 2.

2.2 SURFICIAL GEOLOGY

Most areas of Canada were profoundly affected by the erosive and/or depositional activity of the Quaternary glaciations. Northern New Brunswick is somewhat anomalous in that there are few major glacial features -- erosional or depositional. Bedrock shows little evidence of major glacial erosion, and there is a very meagre cover of glacial sediment throughout the region. There is even some debate as to whether certain portions of northern New Brunswick were glaciated during the Wisconsinan glaciation (Gauthier 1983, Rampton et al. 1984, Seaman 1985). The reader should recognize that glacial materials are seldom more than one or two metres in thickness throughout the region. The bedrock is very severely fractured and broken for several metres depth and the location of, and differentiation of, Quaternary sediments (and aggregate resources) is often difficult.

Rampton et al. (1984) have presented the most detailed and up-to-date interpretation of the deglaciation of the area.



BEDROCK GEOLOGY

Figure 2

(After St. Peter 1978)

Legend

LOWER DEVONIAN

- TEMISCOUATA FORMATION: Siltstone, slate, minor greywacke and sandstone
- Rhyolite

SILURIAN

- PERHAM FORMATION in St-Léonard-Siegas area: Calcareous slate and sandstone
- UPSALQUITCH FORMATION: Siltstone, minor greywacke, slate, sandstone, conglomerate

ORDOVICIAN and or LOWER SILURIAN

- MATAPEDIA GROUP: Argillaceous limestone, calcareous shale, minor limestone, sandstone, slate and conglomerate

ORDOVICIAN

- GROG BROOK GROUP: Slate, siltstone, sandstone, minor greywacke and conglomerate
- Geologic Boundary (approximate, assumed)
- Fault

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Their chronology is summarized in the following paragraphs and comments specific to the present study area have been added.

Deglaciation began in the area with the slow northward retreat and disintegration of the North Maine - Notre-Dame ice complex just prior to 12,400 years Before Present (B.P.). The ice centre was located on the northern edge of the map area, in the Notre-Dame Mountains, but prior to deglaciation extended southward across the entire study area.

The Quaternary deposits in the southwest corner of the study area near the Siegas River were probably exposed in the early phases of the northwestward retreat of the North Maine - Notre-Dame ice centre. Observations in the Quisibis Mountain area (05-5, 05-106) and the valley of the Little Main Restigouche River (05-2 and 05-3) are consistent with a weak ice marginal position. The presence of ice-contact and ablation features in the Siegas River area, plus a generally thicker blanket of till and ablation materials south of the Quisibis Mountain Moraine, suggests that the ice was changing its flow regime during this phase of retreat. North of Quisibis Mountain the Quaternary sediments are largely restricted to small local cross-valley features. This apparent shift in the mode of glacial deposition also correlates with the presence of the Temiscouata Formation (siltstones) and the increased relief of the Madawaska Hills physiographic subdivision.

The North Maine-Notre Dame ice centre was in rapid decline at this time and it broke into two smaller features - the Saint-Quentin and Sisson Branch ice centres. The Saint-Quentin ice centre became a separate complex centered around the present towns of Kedgwick and Saint-Quentin. The Notre-Dame ice centre continued to be active in the northern and northwestern

portions of the study area. Notre-Dame ice flowed in a south-easterly direction along the Gounamitz, Kedgwick and Patapedia river valleys. A number of cross-valley morainic features such as those at Third Lake (N16-8) and States Lakes (013-103, 013-1, 013-2) were probably deposited at this time. The Saint-Quentin ice centre probably laid down the Kedgwick esker and many of the ice-contact and ablation features in the Kedgwick - Saint-Quentin area at this time.

Continued shrinking of the Saint-Quentin ice centre opened the Upsalquitch-Oxford Brook-Tobique River drainage channel along the eastern edge of the study area at approximately 12,200 years B.P. The McKenzie Lake (011-3, 011-4) and Poison Lake (011-16) ice-contact and outwash complexes were likely deposited when the ice margin was standing adjacent to the Upsalquitch channel.

Rampton suggests the development of "A poorly developed interlobate moraine with numerous associated meltwater channels along Grog Brook to the "northeast of Kedgwick..." (Rampton et al. 1984, p.53) during the separation of the Saint-Quentin and North Maine - Notre-Dame ice centres. While field work was being conducted (September and October 1985) all of Highway 17 between Kedgwick and Adams Gulch was being reconstructed. All road cuts and pit faces were well exposed throughout this area. No evidence of the interlobate moraine was found -- in fact very little Quaternary sediment of any type is present in the area. Numerous meltwater channels which flow eastward toward Grog Brook were encountered and several of these had mappable outwash gravel deposits in them (014-5, 6, 7 and 011-1, 2). Just south of the "interlobate moraine", at Whites Brook there are similar outwash channels (011-5, 10) which drain south-eastward into the Northwest Upsalquitch River. A small esker

(014-3), which trends in an east-west direction, was mapped in the area north of Grog Brook.

Small quantities of outwash were deposited in the major river valleys throughout the study area during the final stages of retreat and melting. The modest size of the valleys and the outwash deposits along them suggest that there was little vigor left in the ice at this time. Further decline in river levels resulted in the deposition of the ancient alluvial deposits along many of the drainageways, particularly the Grand, Restigouche and Patapedia rivers. A small amount of reworking of these materials is occurring in the modern river channels today.

3.0 GRANULAR AGGREGATE RESOURCES

3.1 SOURCES

3.1.1 OUTWASH

Glaciofluvial outwash comprises approximately 32% of the granular deposits identified in the study area. It occurs principally in the valleys of the main rivers such as of the Restigouche, Patapedia, Gounamitz and Siegas rivers.

In general the outwash deposits encountered are relatively small and thin. This is due to the apparent slow in situ decline of glacial ice during final deglaciation of the region. It is apparent that the ice's thickness and therefore its vigor and erosive power was minimal in the area. Meltwater volumes were small and drainage was conducted via many small channels.

The outwash deposits in the study area are commonly located 5 to 15 m above the present river levels. The deposits also commonly have moderate grain sizes (commonly sandy medium gravel) and display fair sorting, rounding and bedding development. This indicates a moderate, steady water flow at levels which were only slightly higher than present day flows.

These materials are significantly different from local alluvial sediments and they are a superior aggregate resource.

- They are commonly better sorted and contain fewer fines.
- They are generally thicker and more consistent deposits.
- They exhibit less textural variability.
- They are further removed from the active riverbed and are easier to extract.

It should be recognized that the outwash materials encountered were occasionally gradational to ice-contact sediments (e.g. 05-1), ablation sediments (e.g. N16-3) and ancient alluvial sediments (e.g. the Siegas River near Notre-Dame-de-Lourdes). The final assignment of each deposit was based on both geologic factors and its potential as an aggregate source.

Outwash terrace deposits have been identified in the valley of all the major rivers. These deposits are clearly identifiable on the aerial photographs, although they are inaccessible for field checking. These deposits have not been included as resources, but the larger deposits such as those along the Little Main Restigouche, Restigouche and Patapedia rivers are likely to contain substantial quantities of granular materials.

Numerous small meltwater channels are shown on the maps. Many more smaller channels exist. These features indicate the general network of drainage and identify areas where small pockets of outwash may be present (e.g. 012-10, 011-105). The channels may warrant more detailed exploration for granular materials if there is a local need.

3.1.2 ICE-CONTACT SEDIMENTS

Ice-contact stratified drift is material which has been water-sorted but deposited in proximity to glacial ice. These sediments may therefore vary from a well-sorted outwash-type gravel to poorly sorted till. The most significant factor with respect to their value as aggregate is variability.

Ice-contact sediments are important aggregate sources in the study area. They comprise the two major aggregate sources (the

Kedgwick esker and the Siegas River kames) which constitute a large proportion of the available aggregate in the area.

The Kedgwick esker is a long irregular hummocky ridge stretching along Highway 17 from Kedgwick to Five Finger Brook. It contains numerous pits (011-12, 13, 18 through 26) and the two most active sustained extraction operations in the study area (05-21 and 05-22). The content of fines in the material ranges from less than 1% to 11% and deleterious lithologies range from 28% to 64%. The proportion of unsound lithologies is significantly lower than the general average in the area. Grain size varies from pit to pit but the core of the esker is generally coarser grained. A facies change from coarse gravel in the core to fine sands in the flank is well developed in 05-21 and 05-22 through 05-24. Associated kames (05-20) and a rolling bedrock topography tend to mask the true morphology of the deposit.

There are a variety of massive ice-contact and kame features in the extreme southwest corner of the study area in the Siegas River area. There are a number of pits in these deposits (05-11 to 05-16) and one pit (05-15) contained portable crushing facilities when sampled (October 1985). Fines ranged from 0.2 to 14.5% and unsound lithologies from 65 to 87%. The proximity of these deposits to the outwash sediments of the Saint John River valley has discouraged their exploitation. They will gain in importance as the Saint John River valley materials are exhausted.

Smaller scattered ice-contact deposits were located at Adams Gulch (014-3), Eightmile Lake (012-2 and 3), Kedgwick (011-11, 011-14, 011-15, 011-28, 011-110), McKenzie Lake (011-3),

Poison Lake (011-17) and the Little Main Restigouche River (05-2 and 05-3). All of these deposits occupy meltwater drainageways and appear to have originated during halts in the recession of the ice. It appears that during the late stages of ice decline there may have been significant ice masses in many of the valleys in the study area.

3.1.3 ABLATION MATERIALS

Ablation materials are found throughout the study area. They range in composition from loose stony sand tills to well bedded sandy gravel. These materials are typically unpredictable in occurrence, thickness and composition.

Ablation materials are common as a veneer (0 to 5 m) over weathered bedrock and are usually composed of till with variable proportions of sorted material. Only locally do thicknesses exceed two metres over extensive areas. Small areas are difficult to detect especially when forested. Larger areas tend to support more vigourous tree growth.

Ablation materials may locally contain useable pockets of granular material (eg. 014-4) but are often suitable only as borrow material. Several ablation deposits were noted to take the form of cross-valley morainic features (eg. 05-115). Extensive areas of ablation materials were noted near Wild Goose Lake (N16-3) and near Saint-Quentin (011-11, 112, 113). These areas both occur where there is subdued surface topography.

3.1.4 ANCIENT ALLUVIUM

Ancient alluvium is composed of a variable mixture of sand, gravel and silt. It occurs adjacent to modern rivers and

creeks and usually two to five metres above the river level. It is transitional to modern alluvium but can be distinguished from it by the following characteristics.

- commonly coarser materials (sand and gravel) are dominant
- greater consistency of grain size
- elevated several metres above river level
- seldom flooded
- dry enough to maintain tree growth (and enable extraction operations)

Ancient alluvium is also transitional to outwash but can be distinguished by:

- less well developed sorting and rounding
- commonly finer grained materials
- closer to river level and generally thinner deposits limited by the water table or bedrock
- generally small volumes
- susceptible to occasional flooding

Ancient alluvium was formed by present day rivers and streams but at a time when water volumes and flow rates were somewhat greater than today. Thus the material is better sorted and more consistent that the modern equivalent. These materials have been used in small volumes for local projects (e.g. 012-5, 6, 7 on the Gounamitz Road).

Ancient alluvium, in general, is not a good aggregate source It is suitable for use where high quality or large volumes are not required. These deposits are common in the study area particularly in the Restigouche - Little Main Restigouche

drainage system and occur in many regions where no other aggregate sources exist. The ancient alluvium occurrences are noted on the maps and selected loctions have been tested. Reserves of ancient alluvium have not been calculated.

3.2 QUALITY

3.2.1 GRAIN SIZE

There are four problems that can be associated with the grain size of a deposit: the proportion of fine material, the presence of oversized material, the distribution of the various grain size fractions (grading), and the variability of a deposit.

An excess of fines (silt and clay sized material finer than 75 μm or 200 mesh) renders an aggregate unsuitable for many specific uses. The New Brunswick Department of Transportation (D.O.T.) sets specific limits on the amount of fines permitted in aggregates used for such things as asphalt pavement and structural concrete. Washing can be used to reduce the fines in a material but this substantially increases production costs. Most subbase and base course specifications require less than 10% fines by weight.

Most of the aggregates surveyed in the present study contained less than 10% fines. A considerable amount of variability was noticed in this parameter from deposit to deposit and within individual deposits (eg. the Kedgwick esker).

The grading, or proportions of the various sizes of material in the aggregate is also specified by the D.O.T. These limits ensure a generally even proportion of each size range in the aggregate. Exact specifications are often specific to each

individual contract. This factor is not generally a problem with the deposits of the study area.

An excess of coarse material can pose operational problems but will not necessarily affect the quality of a deposit. Boulders or cobbles larger than 10 cm may be too large for portable crushing equipment and have to be removed. This removal will often increase operational costs. The proportion of oversized (>10cm) material has been estimated for each location to supplement laboratory grain size analyses and give a general impression of each deposit's "workability".

The variability of a deposit can be an important consideration in the use of an aggregate deposit. Many deposits in the area exhibit variability. In a few cases (e.g. 011-31, 011-26, 05-24) variability is pronounced. Ablation and ice-contact materials are particularly prone to this problem. The variability of a deposit has a direct bearing on two factors: the ability of an operation to maintain a consistent quality of product (i.e. meet D.O.T. specifications), and the costs of working a variable deposit in order to maintain product quality.

Virtually all the deposits in the study area exhibited some variability, particularly the ice-contact deposits. Only in a few instances (noted in pit reports) did these pose severe restrictions.

3.2.2 LITHOLOGIES

The composition of the individual pebbles in the aggregate has an effect on its performance. Ideally, clasts should be hard, strong, uncoated and resistant to both chemical and physical weathering. In practice there is always a proportion of clasts

that are considered "unsound" -- they are likely to weaken any structure or road surface they are used in. This has proven a serious problem in the study area.

There are several ways of assessing the soundness of an aggregate. Detailed lithologic analysis, the magnesium sulphate soundness test and the Los Angeles abrasion test are the most common for overall aggregate quality determinations. Numerous additional tests address specific properties. Precise testing methods are published by the American Society for Testing and Materials. Petrographic analyses were conducted as a routine test in the present study. Magnesium sulphate and Los Angeles abrasion testing has been conducted on samples from some pits by the D.O.T. These data are summarized and referenced where results are available (Appendix A).

A lithologic analysis of 100 pebbles of the 2.5 to 5.0 cm size range was conducted for selected deposits in the area to give a general assessment of aggregate quality. Pebbles are separated according to rock type and soundness. The results of these analyses will enable a preliminary assessment of the quality of the stone in a deposit and identify specific problem lithologies. Where D.O.T. data are available test results can be cross-referenced. These data will yield a good general impression of a deposit's quality but more detailed and exhaustive testing should precede any major extraction operation if high quality aggregate is required.

The sound lithotypes encountered include sandstones, siltstones, argillites and occasional igneous, metamorphic or quartz rocks. Sound sedimentary rocks were often well cemented with carbonate. Unsound lithotypes commonly included shale, fissile siltstone, and fissile argillites. In general the

geologic lithotype was not as important a factor as the physically sound or unsound character of the individual clast.

Most of the rocks encountered were derived from local bedrock sources in which fine-grained clastic sediments are dominant. Flattened unsound pebbles were commonly observed. The deposits of the area area contain high proportions of unsound lithotypes -- commonly more than 50% and occasionally over 90%.

4.0 CONCLUSIONS

Recoverable reserves of granular aggregate material in the study area are estimated to be approximately 38.3 million cubic metres. Most of these materials are either ice-contact (62%) or glaciofluvial outwash (32%). Many small scattered occurrences of outwash, ice-contact and ablation materials have not been included in this estimate. Similarly, occurrences of ancient alluvium are not included. All these small occurrences have potential as local sources but do not constitute as viable commercial reserves of aggregate.

Poor lithologic characteristics of the course aggregate limit the quality of the deposits in the study area.

5.0 REFERENCES

BRINSMEAD, R.A., 1979: Granular Aggregate Resources, Upsalquitch Forks (N.T.S. 21 O/10) and Nepisiguit Lakes (N.T.S. 21 O/7) Map Areas; New Brunswick Department of Natural Resources, Mineral Resources Branch, Open File Report 79-11.

DAVIES, J.L. and SEAMAN, A.A. 1982. Bedrock and Surficial Geology, Saint-Quentin, New Brunswick; New Brunswick Department of Natural Resources, Mineral Resources Branch, Open File Report 82-32.

DUBÉ, R. 1982. Rapport Pédologique, Saint-Quentin - Kedgwick; Ministère de l'Agriculture et de l'Aménagement du Nouvreau-Brunswick, 129 p.

FINAMORE, P.F. 1979. Granular Aggregate Resources of the Campbellton and Escuminac Map Areas, New Brunswick (N.T.S. 21 O/15, 22 B/1); New Brunswick Department of Natural Resources, Mineral Resources Branch, Open File Report 79-12.

GAUTHIER, R.C. 1982. Surficial Deposits of Northern New Brunswick; Geological Survey of Canada, Open File Report 856, 10 maps at 1:100 000 scale.

GAUTHIER, R.C. 1983. Surficial Materials of Northern New Brunswick; Geological Survey of Canada, Open File Report 963.

JONES, R.A. 1961. Geological Notes, Wild Goose-Baker Lake Area, Restigouche and Madawaska Countries; New Brunswick Department of Natural Resources, Mineral Resources Branch, Geological Note Series 58-1.

KINGSTON, P.W. 1976. Geology of the Saint-Quentin Marl Deposit and a Comparison of Agricultural Lime Sources for the Saint-Quentin/Kedgwick Area; New Brunswick Department of Natural Resources, Mineral Resources Branch, Topical Report 76-14.

KITE, J.S., LOWELL, T.V. and NICHOLAS, G.P. 1982. Quaternary Studies in the Upper Saint John River Basin: Maine and New Brunswick; Guidebook for the 1982 New Brunswick Quaternary Association Field Trip, August 1982, New Brunswick Department of Natural Resources, Mineral Resources Branch, Reference 64 (J. Thibault, ed.).

LANGMAID, K.K. MacMILLAN, J.K. and LOSIER, J.G. 1980. Soils of Madawaska County New Brunswick; Eighth Report of the New Brunswick Soil Survey, New Brunswick Depart- of Agriculture and Rural Development.

RAMPTON, V.N., GAUTHIER, R.C., THIBAULT, J., and SEAMAN, A.A. 1984: Quaternary Geology of New Brunswick; Geological Survey of Canada, Memoir 416, 77 p.

SEAMAN, A.A. 1985. Glaciation of the Northern Miramichi Highlands,New Brunswick; Geological Association of Canada, Program with Abstracts, Volume 10, Fredericton, 1985, p. A55.

ST. PETER, C. 1978. Geology of Parts of Restigouche, Victoria, and Madawaska Counties, Northwestern New Brunswick, N.T.S. 21 N/8, 21 N/9, 21 O/5, 21 O/11, 21 O/14; New Brunswick Department of Natural Resources, Mineral Resources Branch, Report of Investigations Number 17.

THIBAULT, J. 1979. Granular Aggregate Resources of the Grandmaison (N.T.S. 21 N/9) and Edmundston (N.T.S. 21 N/8) Map Areas; New Brunswick Department of Natural Resources, Mineral Resources Branch, Open File Report 79-31.

THIBAULT, J. 1980. Granular Aggregate Resources Saint-André (N.T.S. 21 O/4), Aroostook (N.T.S. 21 J/13) New Brunswick Department of Natural Resources, Mineral Resources Branch, Open File Report 80-6.

THIBAULT, J. 1985. Granular Aggregate Resources and Surficial Geology of Sisson Branch Reservoir (21 O/6); New Brunswick Department of Natural Resources, Mineral Resources Division, Open File Report 85-3.

VAN GROENEWOOD, H. and RUITENBERG, A.A. 1982: A Productivity Oriented Forest Site Classification System for New Brunswick; Maritimes Forest Research Centre, Fredericton, New Brunswick, Information Report M-X-136, Canadian Forestry Service, Department of the Environment.

APPENDIX A

Pit Descriptions

Location: N16-1 **County:** Restigouche

Type Of Deposit: Ice-Contact (esker) **Parish:** Saint-Quentin

Exposure Type: Hand dug test pit **NTS:** 21 N/16

Status: Undeveloped **UTM:** 503 039

Section Description & Comments:

Test pit and sampling location on a small ridge (3 to 4 m high). Cobbles and boulders exposed at surface. Stony sand till is exposed over bedrock in the immediately adjoining areas.

Visual estimate of grain size from exposures: 5% >10.0 cm, 45% 10.0 - 2.5 cm, 35% 2.5 cm - 0.5 cm, 15% <0.5 cm (5% fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
		92.2	89.0	77.2	63.5	51.1	38.9	28.5	18.3	7.9	4.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 77		Sound Lithotypes % 23	
Sandstone	28%	Greywacke	12%
Siltstone	25	Sandstone	6
Argillite	12	Argillite	4
Greywacke	11	Siltstone	1
Shale	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
Limited		2 to 3	Limited

Location: N16-2 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Stream cut and small pit **NTS:** 21 N/16

Status: Undeveloped **UTM:** 716 993

Section Description & Comments:

Outwash material appears as a shallow irregularly exposed blanket of material overlying an undulating bedrock surface. There are several other small exposures in the general area. The maximum exposure is approximately 2 m in a small roadside pit. Almost all the material is less than 5 mm in size. Approximately 10 to 15% fines were observed.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING							99.9	97.4	55.1	16.7

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		2	

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Location: N16-3 **County:** Restigouche

Type Of Deposit: Ablation-outwash **Parish:** Saint-Quentin

Exposure Type: Road cut and small pit **NTS:** 21 N/16

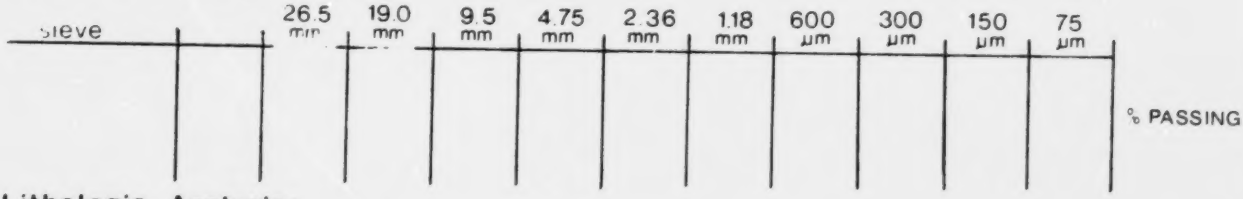
Status: Inactive **UTM:** 539 978

Section Description & Comments:

This site is the best exposure in a broad area of hummocky ablation-outwash material in the low portion of the Wild Goose Branch. Generally the materials are close to water level. Overall material exposed at N16-3 is approximately 3m of gravelly sandy till. The material is variable and shows some water sorting in places. Maximum boulder size is 15 cm and many pebbles are flat and rounded. The surface both at the sample site and throughout the deposit is hummocky.

Visual estimates of the grain size in all available exposures is 2% >10.0 cm, 20% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 38% <0.5 cm (25% fines).

Mechanical Analysis: N.A.



Lithologic Analysis:

Unsound Lithotypes % 83		Sound Lithotypes % 17	
Shale	54%	Greywacke	9%
Siltstone	13	Sandstone	3
Sandstone	7	Volcanic	2
Greywacke	5	Argillite	2
Argillite	4	Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
512		3	Extensive area but thin

Location: N16-4 County: Restigouche

Type Of Deposit: Alluvium Parish: Saint-Quentin

Exposure Type: Road cut and small pit NTS: 21 N/16

Status: Inactive UTM: 557 964

Section Description & Comments:

Shallow low lying deposit along Wild Goose Branch southeast of N16-3. Small road cut exposes up to 2 m of gravel and sand.

Visual estimates of grain size from exposure indicate 5% >10.0 cm, 35% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 15% <0.5 cm, fines are high locally.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	96.0	92.3	77.1	61.5	47.8	31.8	11.7	4.2	1.1	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 77		Sound Lithotypes % 23	
Siltstone	25	Greywacke	14
Argillite	16	Sandstone	5
Greywacke	15	Argillite	3
Sandstone	12	Quartz	1
Shale	9		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves m^3 probable
			Limited

Location: N16-5 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Road cut **NTS:** 21 N/16

Status: Undeveloped **UTM:** 626 935

Section Description & Comments:

This is a small deposit within general bedrock terrain. It is typical of many in the area. Approximately 3 to 4 m of fine sand with minor gravel.

Visual estimates of grain size from exposure indicate 5% >10.0 cm, 35% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 15% <0.5 cm (fines are high locally).

Mechanical Analysis:

sieve			26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
				100	99.1	97.9	96.3	94.2	91.3	78.8	17.3	4.1	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
			Limited

Location: N16-6 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Roadside pit NTS: 21 N/16

Status: Inactive UTM: 659 922

Section Description & Comments:

The exposures are in a remnant of an outwash terrace. Total thicknesses are in excess of 10 m. Material is well bedded gravel with occasional beds of fine gravel and sand. Material is generally rounded to subrounded.

Visual estimate of grain size over all exposed surfaces: 10% >10.0 cm, 45% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 10% <0.5 cm.

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	98.3	87.2	74.3	60.9	48.7	36.6	15.0	3.9	1.3	% PASSING

Lithologic Analysis:

Unsound Lithotypes	% 60	Sound Lithotypes	% 40
Sandstone	31%	Greywacke	23%
Siltstone	16	Sandstone	12
Shale	6	Argillite	2
Greywacke	4	Granite	2
Argillite	3	Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves m^3 probable
6	2	10	200 000

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Location: N16-7 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Road cut and pit **NTS:** 21 N/16

Status: Inactive **UTM:** 697 916

Section Description & Comments:

The deposit is similar to N16-4 and N16-5. It is a remnant outwash deposit within the bedrock valley now occupied by the Pemouet Branch. The remnant is a small mounded feature and contains mainly gravel. Pebbles are generally rounded and flat in shape. Exposure is approximately 3 m.

Visual estimates of grain size from exposures indicate: 5% >10 cm, 30% 10 cm to 2.5 cm, 55% 2.5 cm to 0.5 cm, 10% <0.5 cm.

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	94.4	85.4	63.6	51.6	36.6	30.2	19.1	6.8	2.1	0.6	% PASSING

Lithologic Analysis:

Unsound Lithotypes	% 66	Sound Lithotypes	% 34
Sandstone	20%	Greywacke	20%
Argillite	16	Sandstone	9
Shale	13	Argillite	4
Siltstone	12	Granite	1
Greywacke	4		
Schist	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: N16-8 County: Madawaska

Type Of Deposit: Ablation Parish: Saint-Joseph

Exposure Type: Hand dug test pit NTS: 21 N/16

Status: Undeveloped UTM: 473 888

Section Description & Comments:

This site was selected to examine the apparent damming of the Third Lake valley. The valley is basically founded in bedrock but contains significant coverings of sand, till and occasionally gravel on the valley floor. Although the morphology of the materials suggests a valley train-outwash deposition, the materials include till and show a large degree of variability. The materials are therefore classified as ablation. They are similar to occurrence and nature to deposit N16-3. Many of the deposits form a thin veneer of granular material overlying the bedrock.

Visual estimates of grain size from available exposures indicate: 5% >10.0 cm, 20% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 40% <0.5 cm (locally high fines).

A maximum of 2 m of material was observed but locally thicker materials are probable. The large cross-valley feature at N16-8 contains bedrock outcrop - suggesting a rock ridge origin for the feature.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	94.6	79.1	65.1	52.2	41.8	33.4	26.0	17.2	8.8	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 76		Sound Lithotypes % 24	
Siltstone	25%	Greywacke	13%
Sandstone	25	Sandstone	8
Shale	14	Granite	1
Greywacke	8	Volcanic	1
Argillite	4	Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
	Unknown	2	Extensive but thin

Location: 05-1 County: Madawaska

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 895 594

Section Description & Comments:

Deposit 05-1 is a small roadside pit exposure of approximately 10 m of coarse immature gravel of probable outwash origin. The gravel contains numerous cobbles and boulders ranging from 0.1 to 0.5 m. Many of these clasts are flat "plates" of siltstone which are angular to subangular. Very poorly developed bedding is visible which suggests a proximal outwash facies. The deposit is in a small depression between two rock outcrops in the side of the valley occupied by Cedar Brook.

Visual estimate of grain size from available exposures: 35% >10.0 cm, 25% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 15% <0.5 cm (minor fines).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	97.9	93.8	74.2	53.9	32.5	14.8	6.5	3.4	1.8	0.6	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 93		Sound Lithotypes % 7	
Siltstone	60%	Sandstone	5%
Shale	30	Greywacke	2
Sandstone	3		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location:	05-2	**County:**	Madawaska
Type Of Deposit:	Ice-Contact	**Parish:**	Sainte-Anne
Exposure Type:	Pit Face	**NTS:**	21-0/5
Status:	Inactive	**UTM:**	859 555

Section Description & Comments:

This location is a small roadside pit and a series of road cuts for a distance of approximately 4 km in the valley of the Main Restigouche River. Exposures show up to 5 m of sandy gravel with occasional rock outcrops. Approximately 1 m of silt was observed to overlie the gravel at several locations, including the sample site. Water from several valley-side brooks and occasional springs was flowing through the gravel in several locations. Small isolated patches of this material are present along the valley to the northwest. Much of the material is well rounded and sorted in the lower part of the deposit and a cut-and-fill structure was well exposed in the pit side. The material farther up the valley side displays considerable grain size variability and a hummocky surface.

Visual estimate of grain size from exposed faces in main pit: 30% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 30% <0.5 cm (minor fines).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	94.7	76.2	60.6	45.9	31.8	18.4	6.4	2.3	0.6	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 86		Sound Lithotypes % 14	
Siltstone	35%	Sandstone	8%
Argillite	28	Greywacke	4
Sandstone	11	Siltstone	2
Shale	11		
Volcanic	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
185	20	5	1 000 000

Location: 05-3 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 873 532

Section Description & Comments:

Location 05-3 is in an area of probable ice-contact sediments similar to the materials described in deposit 05-2. The topography is irregular to hummocky and several road cuts expose stony sand till within the deposit. The fines content is variable up to 10% (ablation till). The material contains a significant number of subangular boulders (0.1 to 0.5 m) and is poorly sorted. One prominent granitic cobble was present. Samples were taken from the better sorted material (6 m face).

Visual estimate of grain size from available exposures: 20% >10.0 cm, 30% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 30% <0.5 cm (2 to 10% fines).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	93.6	76.7	59.8	43.5	29.1	18.9	10.7	6.1	2.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 57		Sound Lithotypes % 43	
Siltstone	40%	Siltstone	12%
Sandstone	7	Sandstone	11
Argillite	7	Argillite	10
Shale	3	Greywacke	6
		Quartz	3
		Granite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
80	15	4	600 000

Location: 05-4 County: Victoria

Type Of Deposit: Ablation Parish: Drummond

Exposure Type: Pit Face NTS: 21-0/5

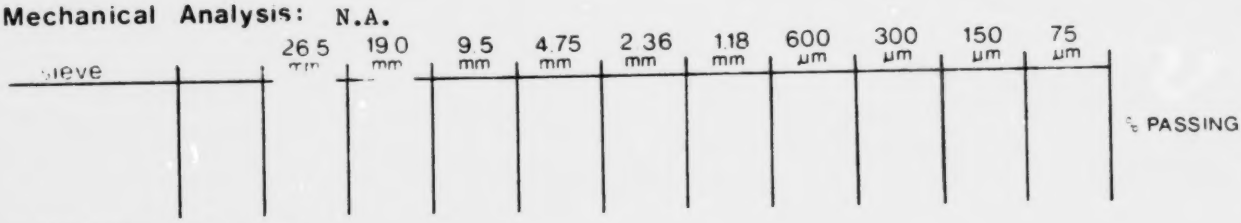
Status: Inactive UTM: 097 538

Section Description & Comments:

Deposit 05-4 comprises two small patches of hummocky material in a bedrock area. Up to 4 m of clayey silty sandy gravel is present -- this material is slumped badly but is probably ablation till. Clasts are moderately well rounded.

Visual estimate of grain size from available exposures: 20% >10.0 cm, 25% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 30% <0.5 cm (15% fines).

Mechanical Analysis: N.A.



Lithologic Analysis:

Unsound Lithotypes % 25		Sound Lithotypes % 75	
Siltstone	17%	Siltstone	37%
Sandstone	7	Sandstone	22
Shale	1	Greywacke	10
		Quartzite	5
		Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable

Location: 05-5 County: Madawaska

Type Of Deposit: Ablation Parish: Rivière-Verte

Exposure Type: Road Cut NTS: 21-0/5

Status: Undeveloped UTM: 766 534

Section Description & Comments:

Location 05-5 is a sample site from a road cut at the base of Quisibis Mountain. This is the only portion of a broad area of ablation materials around the mountain, particularly on the south between Quisibis Mountain and Larry Brook which is accessible. This site was field checked and sampled to provide some data that may be pertinent to the large southern part of the deposit which is inaccessible. The road cut exposes 3 m of gravelly sand till. Clasts are mainly angular to sub-angular with occasional rounded clast.

Visual estimate of grain size from exposures: 5% >10.0 cm, 10% 10.0 cm to 2.5 cm, 50% 2.5 cm to 0.5 cm, 35% <0.5 cm (5 to 10% fines).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	98.9	96.9	81.4	62.4	49.1	32.8	25.1	18.0	11.0	5.5	% PASSING

Lithologic Analysis:

Unsound Lithotypes	% 91	Sound Lithotypes	% 9
Siltstone	67%	Sandstone	5%
Argillite	11	Greywacke	2
Sandstone	8	Siltstone	2
Shale	4		
Greywacke	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
35	15	2	300 000

Location: 05-6 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 865 467

Section Description & Comments:

Location 05-6 is a small pit in an old outwash channel near Miller Line Cache. The pit exposes approximately 4 m of moderately well sorted and rounded sandy medium gravel. Many siltstone pebbles were observed on the surface. This location is typical of many similar small pockets of granular material found scattered along abandoned outwash channels in the map area.

Visual estimate of grain size from available exposure: 10% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 30% <0.5 cm (up to 5% fines).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	98.2	79.8	56.9	34.5	19.2	9.7	2.7	1.6	0.8	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 76		Sound Lithotypes % 24	
Siltstone	54%	Sandstone	11%
Argillite	9	Greywacke	4
Shale	8	Volcanic	3
Sandstone	4	Quartz	3
Volcanic	1	Argillite	2
		Quartzite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
	Limited	4	Limited

Location: 05-7 **County:** Madawaska

Type Of Deposit: Ice Contact (kame) **Parish:** Notre-Dame-de-Lourdes

Exposure Type: Pit Face **NTS:** 21-0/5

Status: Inactive **UTM:** 901 473

Section Description & Comments:

Location 05-7 is a rambling pit in a well developed kame on the Restigouche Road east of Miller Line Cache. There is an unopened kame of similar morphology on the other side of the road (included in reserve estimates). Bedding of materials is chaotic and variable. Materials vary from clean gravelly sands to poorly sorted till-like sediments. There are numerous small levels of excavation within an overall face of approximately 12 m. Sample taken from well-sorted material.

Visual estimate of grain size from all exposures: 10% >10.0 cm, 25% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 40% <0.5 cm (5 to 10% fines average).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	96.5	80.6	61.8	42.3	21.2	8.8	3.8	2.3	1.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 60		Sound Lithotypes % 40	
Siltstone	46%	Siltstone	21%
Shale	9	Sandstone	7
Sandstone	5	Quartzite	3
		Quartz	3
		Volcanic	3
		Greywacke	2
		Granite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
9 (western portion)	7	12	840 000
8 (eastern portion)	8	10	800 000
			1 640 000

Location: 05-8 County: Victoria

Type Of Deposit: Ablation Parish: Drummond

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 042 465

Section Description & Comments:

Location 05-8 is a small pit located on the north side of Highway 17 at Black Brook. Pit faces are slumped and partially grown over. Approximately 3 m of material is exposed showing lenses of gravelly sand within a stony sand till. A small excavation in similar material occurs across the road. The material is typical ablation till and water-sorted sand and is similar to many smaller occurrences in the general area.

The D.O.T. has also tested this pit and indicates 2 to 4 m of material which is "fairly well graded" with "somewhat excessive fraction passing the #200 mesh sieve" (74-81). They conclude the material is suitable for borrow and marginal for subbase aggregate, Los Angeles abrasion losses were 30.6% and 30.3%.

Visual estimate of grain size from exposures: 25% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 35% <0.5 cm (5% fines).

Mechanical Analysis:

sieve	32.1 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
74-81	93		7'	58	44	33		12			2.6	% PASSING
74-81	95		90	79	64	53		31			9.4	
74-81	99		87	70	53	38		15			6.6	

Lithologic Analysis:

Unsound Lithotypes % 82		Sound Lithotypes % 18	
Siltstone	45%		
Shale	14	Sandstone	7%
Argillite	11	Siltstone	7
Sandstone	6	Greywacke	3
Greywacke	5	Quartz	1
Calcite	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
	Limited	3	Limited

Location: 05-9 **County:** Victoria

Type Of Deposit: Ablation **Parish:** Drummond

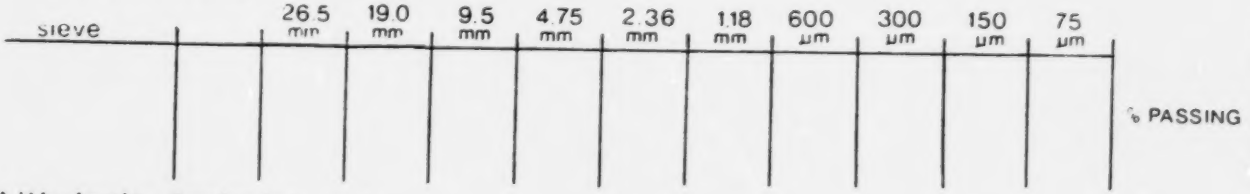
Exposure Type: Pit Face **NTS:** 21-0/5

Status: Inactive **UTM:** 043 446

Section Description & Comments:

Location 05-9 is a badly slumped and overgrown pit. The material appears to be composed almost entirely of weathered shale and siltstone. The largest clasts are slightly over 1 cm in size and visual estimates are: 35% 1 cm to 0.5 cm, 65% <0.5 cm (approximately 15% fines). Clasts are subrounded. The maximum thickness is 5 m and sand till was noted beneath the sand.

Mechanical Analysis: N.A.



Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 05-10 County: Madawaska

Type Of Deposit: Outwash Parish: Saint-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 761 407

Section Description & Comments:

Location 05-10 is located in a small area of probable outwash adjacent to Rob Brook. The deposit is one of several similar deposits in the area. Approximately 5 m of material is present.

The D.O.T. conducted preliminary testing on the deposit (73-65). They note a 30.9% Los Angeles abrasion loss and a high content of fines. The deposit is noted as being "erratic and shallow" and being suitable for borrow only.

Mechanical Analysis:

Sieve	38.1 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
73-65	88		69	56	44	33		19			9.3	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
4	2	3	60 000

Location: 05-11 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-O/5

Status: Inactive UTM: 799 405

Section Description & Comments:

Location 05-11 is one of several masses of ice-contact sand and gravel located near Siegas Lake Settlement. The deposit is a kame-like feature which is banked up against a bedrock high. Significant quantities of material have been removed from the deposit but the faces were badly slumped at the time of sampling. Faces expose approximately 10 m of sandy medium gravel.

Visual estimate of grain size from available exposure: 35% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 25% <0.5 cm (0 to 5% fines).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	95.6	93.5	85.1	66.7	39.8	15.3	4.2	1.3	0.5	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 85		Sound Lithotypes % 15	
Siltstone	30%	Sandstone	4%
Sandstone	23	Argillite	4
Shale	18	Siltstone	3
Argillite	11	Greywacke	3
Greywacke	3	Quartzite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
8	5	10	500 000

Location: 05-12 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 799 400

Section Description & Comments:

Location 05-12 is one of several masses of ice-contact sand and gravel located near the Siegas Lake Settlement. The deposit is a kame-like feature situated on the side of a bedrock high. Significant quantities of aggregate and the underlying till have been removed and faces were badly slumped at the time of sampling. The pit exposes up to 8 m of sandy gravel over 4 m of stony silt till.

Visual estimate of grain size from available exposures (granular only): 10% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 30% <0.5 cm.

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		93.8	87.4	64.5	44.0	27.7	24.1	15.9	7.7	5.9	2.7	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 65		Sound Lithotypes % 35	
Shale	38%	Siltstone	9%
Siltstone	25	Sandstone	8
Sandstone	2	Greywacke	7
		Argillite	4
		Quartz	4
		Volcanic	2
		Diorite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable (m³) probable Reserves
11	7	5	210 000

Location: 05-13 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Faces NTS: 21-0/5

Status: Inactive UTM: 800 398

Section Description & Comments:

Data on deposit 05-11 are derived from three small pits and two Department of Transportation borehole investigation programs (74-112, 74-113). The three small pits expose up to 5 m of sandy medium gravel. Fines contents were approximately 5% in the faces. The material is a low level outwash terrace on the Siegas River.

D.O.T. testing (74-112, 74-113) indicates 2.5 to 4.0 m of material overlying either bedrock or the water table. Los Angeles abrasion losses were 31.1, 36.0, 31.8, 36.9 and 36.6%. Aggregate soundness losses were 7.87, 4.69, 6.34 and 4.13%. Parts of the deposit were considered suitable for borrow, subbase, and possible filter or blending sand.

Mechanical Analysis:

sieve	38.2 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
74-112	92		76	60	44	30		10			2.7	% PASSING
74-112			98	72	49	34		12			4.5	
74-113			96	92	86	80		49			9.2	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
7	7	3	210 000

Location: 05-14 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 806 397

Section Description & Comments:

Locations 05-14 and 05-15 are excavated in one of several masses of ice-contact sand and gravel located near the Siegas Lake Settlement. The deposit is a kame-like feature that is draped on the side of a bedrock high. Location 05-14 represents several small adjoining pits which expose up to 6 m of sandy gravel. Exposed materials appear to contain significant amounts of shale. The material was slumped and poorly exposed at the time of visiting.

Visual estimate of grain size from available exposure: 5% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 35% <0.5 cm (approximately 5% fines).

Mechanical Analysis: N.A.

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING										

Lithologic Analysis:

Unsound Lithotypes % 71		Sound Lithotypes % 29	
Siltstone	37%	Sandstone	16%
Shale	27	Greywacke	5
Argillite	4	Siltstone	4
Sandstone	3	Argillite	3
		Granite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
25	15	10	1 500 000

Location: 05-15 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Active UTM: 804 391

Section Description & Comments:

Locations 05-14 and 05-15 are excavated in one of several masses of ice-contact sand and gravel located near the Siegas Lake Settlement. The deposit is a kame-like feature draped on the side of a bedrock high. Location 05-15 is an active pit with portable crushing equipment in place. Approximately 10 m of sandy gravel is exposed -- the upper portion of the slope has previously been removed. Large amounts of shale are visible and there are several sand interbeds (to 0.5 m) near the base of the face. The present excavation is moving northward from the point where the Siegas River eroded and exposed the materials. Available information suggests that at least 10 m of granular overlies bedrock but both the bedrock surface and granular thicknesses may be variable.

The Department of Transportation has examined the site (82-61). The active face was 15 m at that time (the top portion has since been removed). They note that the deposit is erratic and that the fines content is high. One Los Angeles abrasion test yielded a 37.1% loss.

Visual estimate of grain size from available exposures: 5% >10.0 cm, 25% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 45% <0.5 cm (7 to 10% fines).

Mechanical Analysis:

Sieve	50 mm	31.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
82-61	80	69	58	42	36	32	25	13			7.4	% PASSING
82-61	95	83	69	53	45	40	26	12			6.3	
82-61	98	92	84	71	63	58	42	16			7.2	

Lithologic Analysis:

Unsound Lithotypes % 87%		Sound Lithotypes % 13%	
Shale	65%	Greywacke	4%
Siltstone	21	Siltstone	4
Sandstone	1	Argillite	3
		Sandstone	2

Estimate Of Reserves: (See 05-14)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 05-16 County: Madawaska

Type Of Deposit: Ice-Contact (kame) Parish: Sainte-Anne

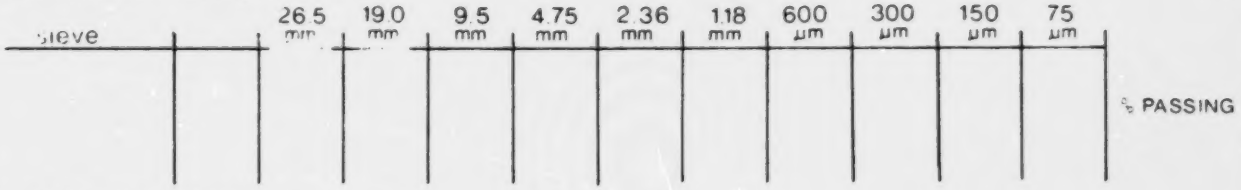
Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 819 400

Section Description & Comments:

Location 05-16 is a pit in an isolated kame in a creek valley at the Siegas Lake Settlement. The crown of the kame has largely been removed. Two metres of sandy medium gravel remains in several parts of the pit overlying the sand that is presently being extracted. Little of the gravel crown remains. Four metres of sand is exposed in the present excavation. It ranges from coarse to fine, is well laminated, and silty. The uniformity of the sand and high fines content will render this deposit desirable for domestic landscaping and fill purposes but exposures indicate that very minor amounts of coarse aggregate remain. Additional exploration may yield aggregate materials at greater depth.

Mechanical Analysis: N.A.



Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Substantial but low grade

Location: 05-17 County: Madawaska

Type Of Deposit: Ablation Parish: Notre-Dame-de-Lourdes

Exposure Type: Pit Face NTS: 21-0/5

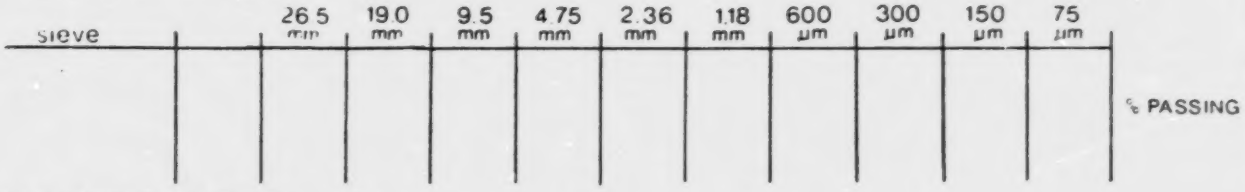
Status: Inactive UTM: 813 381

Section Description & Comments:

Location 05-17 is a small roadside pit in ablation materials. The pit face exposes 2 m of poorly sorted sandy gravel. The material is till-like in places.

Visual estimate of grainsize from available exposure: 5% >10.0 cm, 25% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 30% <0.5 cm (5 to 10% fines).

Mechanical Analysis: N.A.



Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 05-18 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 764 383

Section Description & Comments:

Location 05-18 is a composite description of several small pits adjacent to the Sirois Road along the Petite Fourche Quisibis and two subsurface testing programs by the Department of Transportation (73-64 and 73-67). The deposit is generally shallow -- it is limited by bedrock and the water table. It is also variable in texture. The material varies from gravelly sand to sandy gravel and ranges from 2 to 3 m in thickness. The Department of Transport (73-64) notes Los Angeles abrasion loss values of 32.8 and 31.5%. The material was recommended for borrow and borderline for subbase aggregate.

Mechanical Analysis:

sieve	38.2 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		94.9	91.5	79.6	65.6	49.6	30.9	7.3	1.8	0.3	0.1	% PASSING
73-64	95		86	73	60	44		22			8.1	
73-64	94		85	70	58	47		17			5.4	

Lithologic Analysis:

Unsound Lithotypes % 74		Sound Lithotypes % 26	
Siltstone	31%	Greywacke	7%
Shale	21	Argillite	7
Argillite	13	Sandstone	5
Sandstone	7	Granite	3
Volcanic	1	Siltstone	2
Granite	1	Quartzite	1
		Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
22	11	2	220 000

Location: 05-19 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 782 362

Section Description & Comments:

Location 05-19 was abandoned and largely overgrown at the time of visiting. Observations are based largely on Department of Transport data (73-58). Boreholes indicate 1 to 3 m of medium to coarse gravel overlying rock, water and clay. Los Angeles abrasion losses were 36.5 and 34.9%. The material was recommended for borrow, subbase and borderline base course aggregate.

Mechanical Analysis:

sieve	50 mm	38.2 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
73-58	91	84	68	54	41	29		13			5.7	
73-58	89	85	77	62	49	38		17			8.3	% PASSING
73-58	90	84	67	52	39	29		14			6.0	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
			Limited

Location: 05-20 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 777 354

Section Description & Comments:

Location 05-20 is another small area of shallow outwash adjacent to the Siegas River. The deposit has been investigated by the Department of Transport (65-113). The material ranges from 0.5 to 4.0 m in thickness and is underlain by rock, silt and clay or the water table. A significant portion of the deposit has been depleted. Department of Transportation notes a Los Angeles abrasion loss of 31.6% and that the grading is marginal for certain uses. The material was recommended for borrow, subbase and base course aggregate.

Mechanical Analysis:

sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
65-113	93.7	86.0	76.7	71.7	55.5			17.6			3.9	% PASSING
65-113	90.5	77.0	66.7	58.0	39.4			10.2			2.4	
65-113	89.8	77.0	69.3	61.3	44.3			19.9			3.2	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
8	3	2	60 000

Location: 05-21 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 776 340

Section Description & Comments:

Location 05-21 comprises a long and narrow area of outwash at three levels adjacent to the Siegas River. The area has been stripped and the main face being mined is the upper terrace. The face exposes 4.5 m of horizontally bedded sandy medium gravel with occasional lens or bed of medium to coarse sand.

Visual estimate of grain size from working face: 5% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 35% <0.5 cm (fines minor to 5%).

The Department of Transportation has tested the property (65-12, 73-63, 83-54). They note Los Angeles abrasion losses of 32 to 46% and occasional slight excesses of fines. They recommend specific portions of the deposit for borrow, subbase, and base course aggregate.

Mechanical Analysis:

sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
73-63	96	89	75	61	48	39		18			4.1	% PASSING
73-63	95	89	73	59	48	38		15			3.3	
73-63	92	86	70	55	41	30		13			7.2	

Lithologic Analysis:

Unsound Lithotypes % 61		Sound Lithotypes % 39	
Siltstone	37%	Sandstone	13%
Shale	13	Greywacke	10
Argillite	8	Argillite	8
Sandstone	3	Siltstone	5
		Quartz	2
		Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
17	8	4	320 000

Location: 05-22 County: Madawaska

Type Of Deposit: Outwash Parish: Notre-Dame-de-Lourdes

Exposure Type: DOT test holes NTS: 21-0/5

Status: Undeveloped UTM: 779 333

Section Description & Comments:

This deposit has recently been tested by the Department of Transportation (83-55), It is located on the southern edge of the study area and continues into map area 21-0/4. The material is a sandy medium gravel and appears to be a minimum of 4 m in thickness. Los Angeles abrasion losses were 31.1, 30.7, 30.8 and 32.4%. Several density and absorption tests were also performed and the material has been approved for use as asphaltic base and seal aggregate as well as borrow, subbase and base course aggregate.

Mechanical Analysis:

sieve	50 mm	31.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
83-55	100	89	79	58	43	30		14			6.7	% PASSING
83-55	86	83	75	63	50	35		16			3.0	
83-55	87	78	69	54	43	31		11			4.0	

Lithologic Analysis: N/A

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (21-0/5 only)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
8	8	4	320 000

Location: 05-23 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Saint-Léonard

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 927 354

Section Description & Comments:

Location 05-23 is a poorly exposed badly slumped pit adjacent to Beaver Brook. The pit face exposes approximately 2 m of dense sandy silt till over 8 m of granular material. The granular materials vary from gravelly sand to sandy gravel. It varies from a clean clast-supported fine gravel to very silty till-like material. Bedding is highly irregular. Several similar deposits are present in the area.

Visual grain size estimate of the granular exposures (excluding the till cover): 5% >10.0 cm, 20% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 55% <0.5 cm (0 to 15% fines).

The Department of Transportation has tested the pit (73-33, 74-102) and concludes that some material can be used for subbase and base course. Much of the material contains excessive fines and is recommended for borrow only. Los Angeles abrasion losses are 30.5, 30.6, 32.4 and 35.4%.

Mechanical Analysis:

sieve	38.1 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
73-33	94		85	73	59	44		19			21.2	
73-33	84		68	50	34	20		20			1.8	% PASSING
			100	98.4	92.9	86.2	78.7	67.7	41.6	17.7	6.2	

Lithologic Analysis:

Unsound Lithotypes % 52		Sound Lithotypes % 48	
Siltstone	39%	Sandstone	21%
Sandstone	6	Greywacke	7
Argillite	5	Siltstone	7
Shale	2	Quartz	5
		Argillite	4
		Granite	2
		Quartzite	2

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
12	6	8	480 000

Location: 05-24 County: Madawaska

Type Of Deposit: Ice-Contact Parish: Saint-Léonard

Exposure Type: Pit Face NTS: 21-0/5

Status: Inactive UTM: 942 373

Section Description & Comments:

Location 05-24 is a mound of hummocky ice-contact material overlying an irregular bedrock surface. Approximately 4 m of sandy fine to medium gravel is present. Pebbles are subrounded and there are silty zones within the gravel.

Visual estimate of grain size from exposures: 5% >10.0 cm, 15% 10.0 cm to 2.5 cm, 50% 2.5 cm to 0.5 cm, 30% <0.5 cm.

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		96.4	95.5	84.0	66.0	50.2	37.4	26.2	13.0	4.2	1.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 77		Sound Lithotypes % 23	
Siltstone	48%	Sandstone	7%
Sandstone	13	Greywacke	5
Argillite	9	Siltstone	4
Shale	6	Quartz	4
Diorite	1	Quartzite	2
		Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
4	3	3	90 000

Location: 05-25 County: Madawaska

Type Of Deposit: Outwash Parish: Saint-Léonard

Exposure Type: Pit Face NTS: 21-0/15

Status: Inactive UTM: 970 408

Section Description & Comments:

Location 05-25 is a small area of outwash adjacent to the Grand River at Veneer. Approximately 6 m of sandy outwash is exposed. Much of the pit is slumped and overgrown and reserves are not large. Bedrock is probable at shallow depth and the base of the pit is close to the water table.

Visual estimate of grain size from exposures: 10% >10.0 cm, 20% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 30% <0.5 cm.

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		87.1	79.2	61.1	43.3	27.7	16.0	8.2	3.6	2.0	1.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 82		Sound Lithotypes % 18	
Siltstone	41%	Greywacke	13%
Sandstone	20	Sandstone	5
Shale	15		
Greywacke	6		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-1 County: Restigouche

Type Of Deposit: Outwash Parish: Eldon

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 328 878

Section Description & Comments:

This deposit is located along Robinson Brook at Highway 17. Up to 10 m of outwash sand and gravel is draped over a series of irregular bedrock outcrops. Bedrock is exposed in the pit floor and in road cuts nearby. The material is well bedded with low-angle trough cross-bedding trending in an east-west direction. D.O.T. test holes (78-81) indicate that reserves are very restricted and erratic in occurrence over the bedrock surface.

Visual estimate of grain size in exposed faces: 5% >10.0 cm, 20% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 45% <0.5 cm (minor fines).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	98.3	85.1	67.3	45.0	22.1	7.3	1.9	0.6	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 53		Sound Lithotypes % 47	
Siltstone	26%	Greywacke	18%
Sandstone	19	Siltstone	16
Greywacke	5	Sandstone	13
Quartz	2		
Volcanic	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-2 County: Restigouche

Type Of Deposit: Outwash Parish: Eldon

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 332 877

Section Description & Comments:

This deposit is located along Robinson Brook at Highway 17. Up to 10 m of outwash sand and gravel is draped over a series of irregular bedrock outcrops. Bedrock is exposed in the pit floor and in local road cuts. D.O.T. test holes (78-81) indicate that reserves are very restricted and erratic in occurrence over the bedrock surface. The pit is presently the site of crushing, screening and asphalt plants for work on Highway 17.

Two general pit areas are being mined: 011-2A (farthest from i.e. south of) Robinson Brook (6 m height). Deposit is variable but displays good horizontal and trough cross-bedding (E-W trend). Visual estimate of grain size is exposed faces: 15% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 25% <0.5 cm (0-5% fines). 011-28 (immediately south of Robinson Brook) (7 m height). Visual estimate of grain size from exposed faces: 25% >10.0 cm, 30% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 25% <0.5 cm (0-5% fines), (boulders to 1 m+).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
A		96.4	91.1	68.4	46.1	26.7	11.8	3.7	1.0	0.4	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Significant reserves may remain but occurrence is highly erratic.

Location: 011-3 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Eldon

Exposure Type: Road cut NTS: 21-0/11

Status: Undeveloped UTM: 492 827

Section Description & Comments:

This deposit is a hummocky area of sandy gravel at McKenzie Lake. The material appears to be of ice-contact origin relating to ice resting on the McKenzie Gulch-Burntland Brook bedrock valley. The material is poorly exposed and the thickness is unknown. The regional geology suggests that 5 m or more of material may be present, particularly in the lowest part of the valley.

Visual grain size estimate of materials from several 1 m road cuts:
5% >10.0 cm, 20% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 40% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		97.1	91.0	70.9	51.5	35.7	25.7	14.2	5.9	1.4	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 53		Sound Lithotypes % 47	
Siltstone	45%	Greywacke	35%
Sandstone	5	Siltstone	6
Volcanic	1	Sandstone	5
Shale	1	Quartz	1
Quartz	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
31	25	5	1 250 000

Location: 011-4 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Eldon

Exposure Type: Road cut **NTS:** 21-0/11

Status: Undeveloped **UTM:** 495 818

Section Description & Comments:

This deposit is a series of well-formed outwash terraces near McKenzie Lake. The outwash appears closely related to an area of hummocky sand and gravel of possible ice-contact origin in the McKenzie Gulch-Burntland Brook bedrock valley. The entire deposit appears related to the final melting of an ice body situated in the bedrock valley. Exposures are minimal but general occurrences indicate that up to 15 m of sandy medium gravel may be present in the highest terrace. The outwash is composed of well rounded flattened pebbles.

Visual estimate of grain size from several small cuts (to 2 m): 10% >10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 30% <0.5 cm (minor fines).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		99.1	94.4	71.7	50.1	33.4	21.4	12.1	4.7	1.7	0.5	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 67		Sound Lithotypes % 33	
Siltstone	45%	Argillite	14%
Argillite	18	Sandstone	14
Sandstone	4	Greywacke	5

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
29	29	12	3 480 000
18	18	3	540 000
			4 020 000

Location: 011-5 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 290 818

Section Description & Comments:

This pit is large and shallow with crushing, screening and asphalt equipment in operation. There are large quantities of crushed material on site which suggest the importation of aggregate -- probably from 011-10. Up to 6 m of variable medium gravel with beds of coarse gravel and sand are exposed. Cross-bedding with a dip of approximately 30° to the west is visible in one pit face. D.O.T. has conducted a range of testing on the pit materials (77-35). Los Angeles abrasion losses (2 samples) are 26.8 and 25.4%. Petrographic analyses indicate 65 to 75% calcareous slate, 20% siltstone, 3 to 15% sandstone, 0 to 2% greywacke and a trace of vein quartz, white calcite and pink granite. Test holes confirm that reserves are limited.

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
77-35		92	84	66	53	42		21			8.8	
77-35	86	68	52	32	22	16		8			3.7	% PASSING
77-35	88	78	69	55	44	34		9			2.5	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-6 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 151 806

Section Description & Comments:

This is a small outwash deposit at high level in rock terrain adjacent to the Restigouche River. Rock outcrops occur throughout the area and the deposit rests on an irregular rock surface. Reserves are expected to be irregular in occurrence and limited. The pit exposes 5 m of sandy gravel with occasional silty sections. There are occasional layers of pebbles to 10.0 cm thick. Pebbles range from 0.5 to 2.5 cm in size and commonly have a coating of fines. Pebbles are angular with little rounding and are commonly flat in shape.

Visual estimate of grain size over exposed faces: 2% >10.0 cm, 35% 10.0 cm to 2.5 cm, 48% 2.5 cm to 0.5 cm, 15% <0.5 cm (minor fines - variable).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		92.5	85.9	61.0	31.3	11.7	4.9	2.3	1.3	0.9	0.4	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 38		Sound Lithotypes % 62	
Siltstone	15%	Greywacke	38%
Greywacke	13	Sandstone	21
Sandstone	7	Siltstone	3
Shale	1		
Volcanic	1		
Quartz	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		Irregular	Limited

Location: 011-7 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

Exposure Type: River Cut NTS: 21-0/11

Status: Unopened UTM: 133 788

Section Description & Comments:

River bank section along Little Main Restigouche River south of Kedgwick River. Bank exposes 10 m of uniform, well bedded sandy medium gravel. Material appears clean and uniform and contains more sand than is common in the area.

Visual estimate of grain size from entire exposure: 5% >10 cm, 20% 10 to 2.5 cm, 30% 2.5 cm to 0.5 cm, 45% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		98.8	96.7	79.3	61.6	49.3	39.5	28.2	6.5	0.8	0.3	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 41		Sound Lithotypes % 59	
Siltstone	15%	Sandstone	19%
Sandstone	14	Argillite	16
Argillite	7	Greywacke	13
Shale	4	Siltstone	11
Calcite	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
70	20	8	1 600 000

Location: 011-8 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Grimmer

Exposure Type: Pit Face **NTS:** 21-0/11

Status: Inactive **UTM:** 204 810

Section Description & Comments:

This deposit is an area of shallow outwash in a meltwater channel near Quatre-Milles. Up to 3 m of sandy gravel is exposed with sand lenses and beds to 1 m in thickness. The upper 1 m is sand. D.O.T. data for the pit across the road to the south indicates 0.9 to 1.8 m to rock. The exposed face is approximately 3 m.

Visual estimate of grain size over exposed faces: 5% >2.5 cm, 50% 2.5 cm to 0.5 cm, 45% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	99.4	92.4	77.2	58.1	38.2	22.0	8.2	2.5	0.9	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 84		Sound Lithotypes % 16	
Sandstone	38%	Sandstone	9%
Siltstone	36	Greywacke	4
Argillite	5	Volcanic	2
Shale	5	Siltstone	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
38	21	3	630 000

Location: 011-9 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

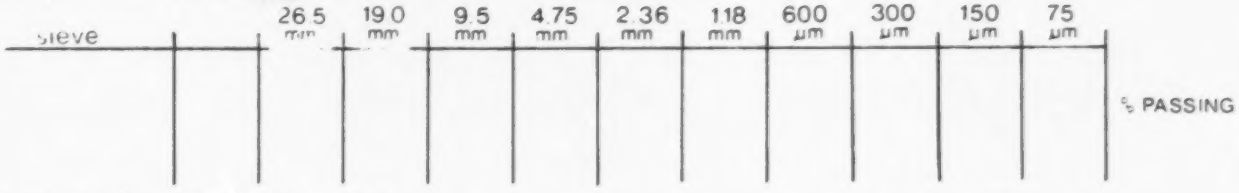
Exposure Type: Pit Face NTS: 21-0/11

Status: Depleted UTM: 287 792

Section Description & Comments:

This small pit is located in one of many small glacial meltwater channels in the area. Approximately 2.5 m of sandy medium gravel remain under and immediately adjacent to the owner's house. The remainder of the deposit has been removed and depletion was confirmed by test holes completed by the D.O.T. (76-53).

Mechanical Analysis: N.A.



Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Depleted

Location:	011-10	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Eldon
Exposure Type:	Pit Face	**NTS:**	21-0/11
Status:	Active	**UTM:**	323 793

Section Description & Comments:

The pit is a large shallow excavation exposing up to 4 m of sandy medium to coarse gravel. The deposit is located in a broad meltwater channel. A large area has been stripped and there are large stock piles of crushed material on the property. The material is moderately to well sorted and clasts are commonly sub-angular and have a flat shape.

Visual estimate of grain size from exposed faces: 15% >10.0 cm, 45% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 20% <0.5 cm (minor fines)

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	98.1	72.1	47.3	28.8	16.4	6.7	1.7	0.3	0.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 73		Sound Lithotypes % 27	
Siltstone	42%	Sandstone	23%
Sandstone	24	Greywacke	4
Argillite	6		
Shale	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
12	8	3	240 000

Location: 011-11 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 251 779

Section Description & Comments:

This is a large shallow pit with weathered bedrock in base of pit. The material is poorly bedded, poorly sorted and the grain size varies. The gravel is largely subangular. Total thickness is approximately 6 m and portions are less.

Visual estimate of grain size in exposed faces: 30% >10.0 cm, 30% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 20% <0.5 cm (0-5% fines).

D.O.T. sampled the pit (83-102) for grain size only and results are listed below.

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
83-102	59	56	52	42	31	19		6			3.7	% PASSING
83-102	57	43	32	20	14	9		4			2.0	
83-102			94.7	75.0	54.5	34.5		6.0			0.3	

Lithologic Analysis:

Unsound Lithotypes % 64		Sound Lithotypes % 36	
Argillite	25%	Argillite	19%
Sandstone	23	Sandstone	13
Siltstone	16	Siltstone	4

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves m^3 probable
10	5	4	200 000

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Location: 011-12 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 221 765

Section Description & Comments:

Data are summarized from D.O.T. (71-14). The pit is badly slumped and testing indicates limited reserves. The material is the northward extension of the Kedgwick esker system, although it is only present as a small area of surface granular material. Test holes confirm 0.3 m to 1.8 m of granular overlying bedrock in the pit and vicinity. Los Angeles abrasion losses (2 samples) are 30.2 and 29.8%.

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
71-14	54	45	37	31	45	21		13			7.1	% PASSING
71-14	95	91	70	52	37	25		8			2.4	
71-14	85	81	67	51	36	26		9			2.4	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-13 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 218 760

Section Description & Comments:

The pit is located in a shallow surface area of granular material which is the northward extension of the Kedgwick esker. The material has little geomorphic form and is a granular veneer draped over the side of a bedrock hill east of Highway 17. The maximum face exposed is 3 m and bedrock is exposed at several places in excavations on the hill side. D.O.T. test holes located between the pit and Highway 17 (71-13) confirm 0.8 to 2.7 m of granular material over bedrock. Excavations are shallow and scattered over the hillside and remaining resources are expected to be limited. Los Angeles abrasion losses (4 samples) are 24.5, 21.9, 26.1 and 24.5%. D.O.T. concludes that the deposit is "erratic shallow, tonnage somewhat limited" but that it can produce borrow, subbase and base course aggregates.

Visual estimate of grain size over exposed faces: 20% >2.5 cm, 30% 2.5 cm to 0.5 cm, 45% <0.5 cm, 5% fines.

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 µm	600 µm	300 µm	150 µm	75 µm	
71-13	88	84	66	51	39	31		16			8.2	
71-13	82	73	55	39	30	23		6			2.0	% PASSING
71-13		98.6	97.8	89.3	78.3	60.7	38.4	15.9	3.3	1.2	0.4	

Lithologic Analysis:

Unsound Lithotypes % 64		Sound Lithotypes % 36	
Sandstone	27%	Sandstone	14%
Siltstone	26	Greywacke	13
Shale	7	Siltstone	6
Argillite	4	Argillite	3

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-14 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Grimmer

Exposure Type: Pit Face NTS: 21-O/11

Status: Inactive UTM: 236 759

Section Description & Comments:

Two pits are excavated in this deposit, one on either side of the C.N.R. rail line. The westerly pit has been recently excavated and samples and observations were taken from this pit. Up to 6 m of chaotically bedded sandy subangular material is exposed. Material ranges from sandy coarse gravel to gravelly coarse sand. There are good northward dipping foresetbeds exposed on the north side of the exposure. Other areas of the pit exhibit nearly horizontal bedding. D.O.T. test holes confirm the presence of at least 3.7 m of gravel over most of the remainder of the deposit to the west (83-101). Test results indicate occasional excessive fines (78-83 and 83-101) and high aggregate soundness losses. Los Angeles abrasion losses (3 tests) are 19.7, 28.4 and 23.7%.

Visual grain size estimate of faces: 20% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 20% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
78-83	82	75	62	47	37	27		15			2.6	% PASSING
83-101	70	60	54	43	31	19		8			6.3	

Lithologic Analysis:

Unsound Lithotypes % 64		Sound Lithotypes % 36	
Siltstone	33%	Sandstone	19%
Sandstone	22	Greywacke	16
Argillite	4	Quartz	1
Shale	4		
Quartz	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
7	3	5	150 000

Location: 011-15 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 258 760

Section Description & Comments:

This is a small badly slumped pit in a stream valley southeast of Kedgwick. A small exposure also occurs on the north side of the valley. Faces are approximately 10 m high. The material is well-bedded medium to fine gravel to gravelly sand. There is no bedrock exposed in the immediate vicinity. Bedrock is probably close to the surface and reserves are likely to be irregular and limited.

Visual grain size estimates of exposed faces indicate: 10% >10.0 cm, 20% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 40% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 µm	600 µm	300 µm	150 µm	75 µm	
		99.4	95.1	76.6	55.2	33.3	13.1	2.9	0.6	0.3	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 79		Sound Lithotypes % 21	
Siltstone	40%	Sandstone	14%
Sandstone	17	Quartz	4
Argillite	12	Argillite	3
Shale	9		
Greywacke	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
			Limited

Location: 011-16 County: Restigouche

Type Of Deposit: Outwash Parish: Eldon

Exposure Type: Hand dug test pit NTS: 21-0/11

Status: Undeveloped UTM: 467 764

Section Description & Comments:

This deposit is located around Poison Lake on the eastern edge of the map area. There are no significant exposures or pits located in the deposit -- due largely to its remote location. The deposit appears to be a surface veneer of ice-contact material with several small flat outwash areas. Thicknesses are unknown but are expected to be variable and depend on the underlying bedrock surface. No reserve estimates are made in view of the lack of data.

Visual estimate of grain size from hand dug test pits: (0.8 m)
10% >10.0 cm, 25% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 30% <0.5 cm (10 % fines).

Mechanical Analysis: N.A.

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 54		Sound Lithotypes % 46	
Siltstone	48%	Siltstone	44%
Shale	4	Sandstone	1
Sandstone	2	Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 011-17 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Eldon

Exposure Type: Road Cut NTS: 21-0/11

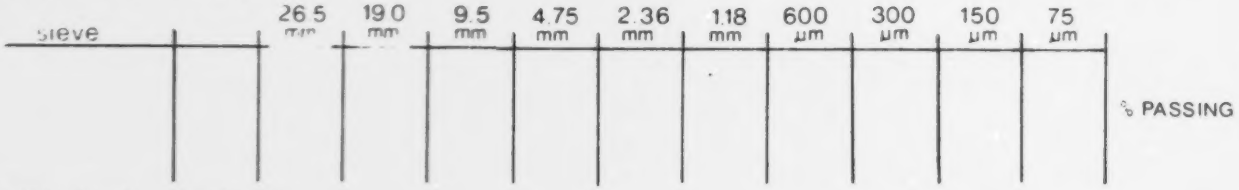
Status: Undeveloped UTM: 468 753

Section Description & Comments:

The deposit is located around Poison Lake on the eastern edge of the map area. There are no significant exposures on pits located in the deposit -- due largely to its remote location. The deposit appears to be a surface veneer of mainly ice-contact materials with several flat outwash areas. Thicknesses are unknown but are expected to be variable and depend on the underlying bedrock surface. A minimum thickness of 2 m was observed. Reserve estimates are tentative in view of the lack of data and irregular morphology.

Visual estimates of grainsize from poorly exposed road cut: 15% >2.5 cm, 45% 2.5 cm to 0.5 cm, 30% <0.5 cm, 10% fines.

Mechanical Analysis:



Lithologic Analysis:

Unsound Lithotypes % 49		Sound Lithotypes % 51	
Siltstone	38%	Greywacke	36%
Shale	6	Siltstone	13
Greywacke	4	Sandstone	2
Sandstone	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
416	300	3	9 000 000

Location: 011-18 **County:** Restigouche

Type Of Deposit: Ice-Contact (Esker) **Parish:** Grimmer

Exposure Type: Pit Face **NTS:** 21-0/11

Status: Inactive **UTM:** 213 742

Section Description & Comments:

This pit face exposes 3.5 m of sandy medium gravel at the northern extremity of esker ridge. D.O.T. drilling and testing in the area (84-10) confirm that aggregate resources are confined to the immediate area of the existing pit. Testing indicates "excessive fraction passint the 75 µm in most of the samples" and that the "deposit is erratic". Los Angeles abrasion losses (3 tests) are 20.9 and 22.2%.

Reserve estimates apply only to the Grimmer Parish portion of the deposit.

Mechanical Analysis:

sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
84-10	69	58	49	38	31	36		15			5.7	% PASSING
84-10	82	68	61	52	45	37		19			9.6	
84-10	100	96	88	78	68	54		28			12.2	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (Grimmer Parish)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
52	10	4	400 000

Location: 011-19 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 212 738

Section Description & Comments:

This pit is badly slumped but exposes material similar to those in adjacent pit 011-18. Data are selected from the D.O.T. report (83-52) which involved 8 test holes and selective testing. The aggregate soundness loss for fine aggregate (1 test) was 3.38%. Los Angeles abrasion loss (1 test) was 19.3%.

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
83-52	100	94	87	76	65	53		19			1.9	% PASSING
83-52	78	64	57	44	35	28		13			5.7	
83-52	100	96	88	69	68	56		10			1.9	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (See 011-18)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 011-20 County: Restigouche

Type Of Deposit: Ice-Contact (Kame) Parish: Grimmer

Exposure Type: Pit Face NTS: 23-0/11

Status: Active UTM: 210 735

Section Description & Comments:

This deposit is a kame adjacent to the Kedgwick esker on the west side of the esker. The core is north of the Saint-Quentin/Grimmer parish line. The kame is a conical hill and is distinct from the ridge form of the esker itself. The material exposed is mainly gravelly sand. Bedding is chaotic and the grain size varies rapidly and widely between exposures. Bedding is well preserved but indicates a variety of flow directions. The pit is being used in conjunction with the coarse esker core materials (location 011-21) and reserves are treated as one deposit. D.O.T. drilled 40 test holes on the property (1976), tested 25 samples for grain size and selected samples for other tests. They conclude "Deposit is erratic ...", "medium to coarse grained material ... can be recommended in borrow and subbase ... fine grained material can be recommended for borrow ... filter, blending and winter sand." (D.O.T. 76-25).

Visual estimate of grain size over exposed faces: 5% >10.0 cm, 15% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 60% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	31.8 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
76-25	90		81	71	61	51		19			2.9	% PASSING
		100	98.2	79.1	60.2	46.6	32.5	14.7	2.5	0.6	0.3	

Lithologic Analysis:

Unsound Lithotypes % 40		Sound Lithotypes % 60	
Siltstone	12%	Sandstone	26%
Sandstone	11	Greywacke	14
Shale	7	Siltstone	11
Argillite	6	Argillite	7
Greywacke	3	Quartz	1
Schist	1	Volcanic	1

Estimate Of Reserves: (See 011-18)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves m^3 probable

Location: 011-21 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 213 735

Section Description & Comments:

This pit is located in the central core of the Kedgwick esker system. The material is markedly coarser in the central core than on the flanks or in the adjacent kame features (011-20). Bedding is coarse and poorly developed. It shows draping to the east and west and a very gentle dip to the south. Material on either side of the esker in the flanks ranges from coarse sand to silt and shows nearly horizontal bedding.

D.O.T. testing from the face (78-69) gives a Los Angeles abrasion loss of 19.6% (1 test) and the grain size results listed below. The material is variable overall and locally contains a high proportion of fines.

Visual estimate of grain size from exposures (central core only):
15% >10.0 cm, 30% 10.0 cm to 1.5 cm, 25% 2.5 cm to 0.5 cm, 30% <0.5 cm (0-5% fines).

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
78-69	97	88	77	61	46	34		8			1.2	% PASSING
		100	98.7	83.9	66.5	41.1	17.7	8.5	3.5	2.0	0.6	

Lithologic Analysis:

Unsound Lithotypes % 45		Sound Lithotypes % 55	
Siltstone	29%	Sandstone	23%
Sandstone	8	Greywacke	15
Shale	4	Argillite	11
Argillite	4	Siltstone	6

Estimate Of Reserves: (see 011-18)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable

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Location: 011-22 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 215 725

Section Description & Comments:

This pit is one of four contiguous pits in the Kedgwick esker system immediately south of the Grimmer/Saint-Quentin parish line, All four pits have been mined from east to west across the esker and the coarser grained core materials have been largely depleted. Bedding is draped to the east and west away from the esker core. Bedding in the esker core is nearly horizontal with a slight southerly dip. At this point the esker has a larger western flank.

The pit is the site of the Restigouce Ready Mix plant. The materials presently being mined are the gravelly sands in the western flank of the esker. The coarse-grained core materials have largely been removed. The pit floor is 2 to 3 m below that of adjacent pits (011-23, 24) and striated bedrock is exposed (Striations 220° Az). Faces contain 3 to 5 m horizontally bedded medium to coarse sand with occasional pebble band and silty fine sand bed, over 6 to 8 m gravelly coarse sand to sandy fine gravel. Los Angeles abrasion loss (D.O.T. 76-27, 1 sample) is 21.5%.

Visual estimate of grain size over exposed faces: 15% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 50% <0.5 cm (5% fines).

Reserve estimates apply to only the Saint-Quentin Parish portion of the deposit.

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
76-27	95	91	75	58	37	18		6			4.7	% PASSING
76-27				98	96	89		18			2.2	
	100	99.0	94.1	86.9	77.1	66.1	53.0	31.9	7.4	3.6	1.6	

Lithologic Analysis:

Unsound Lithotypes % 28		Sound Lithotypes % 72	
Siltstone	16%	Greywacke	30%
Sandstone	8	Sandstone	25
Argillite	4	Argillite	11
		Siltstone	6

Estimate Of Reserves: (Saint-Quentin Parish)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
96	25	10	2 500 000

Location: 011-23 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 215 723

Section Description & Comments:

The general description of this deposit is presented in 011-22.

The pit exposes two 5 m faces in separate lifts with similar sandy coarse gravel exposed in both. This pit is not excavated as far to the west as adjoining pit 011-22 and the exposed material is part of the core facies of the esker. A small remnant of the eastern flank of the esker remains -- it is composed of interbedded fine to pebbly coarse sand. Los Angeles abrasion losses (3 samples D.O.T. 71-11) are 20.6, 20.1 and 26.6%.

Visual estimate of grain size over exposed faces: 25% >10.0 cm, 30% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 20% <0.5 cm (5% fines).

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
71-11	86	78	56	36	18	10		4			2.8	% PASSING
71-11	90	77	56	39	25	77		8			5.9	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (See 011-22)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 011-24 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 215 722

Section Description & Comments:

The general description of this deposit is presented in 011-22.

Present exposure in the pit shows clear gradation from the core to the flank facies of the esker. Pit Face is approximately 10 m in height. Los Angeles abrasion loss (1 sample D.O.T. 71-11) 18.7%.

Visual grain size estimate, core facies: 10% <10.0 cm, 30% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 30% <0.5 cm (5% fines). Visual grain size estimate, flank facies: 5% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 60% <0.5 cm (5% fines).

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
71-11	83	72	46	27	19	14		7			2.9	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (See 011-22)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable

Location: 011-25 County: Restigouche

Type Of Deposit: Ice-Contact (Esker) Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 215 718

Section Description & Comments:

The general description of this deposit is presented in 011-22.

This pit had been inactive for many years and exposure was poor. Total exposure is approximately 10 m. D.O.T. (72-115) tested both the core and flank facies of the esker and obtained a variety of grain size results (example listed below). Los Angeles abrasion losses (4 samples) were 19.7, 25.3, 21.8 and 18.5%. The report notes that the deposit is erratic and that there are difficulties (excess fines and inadequate grading) in using parts of the resource.

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
72-115		83	63	47	36	28		10			5.3	
72-115	96	93	87	80	73	65		38			6.2	% PASSING
72-115			99	98	97	96		81			12.0	

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (See 011-22)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 011-26 **County:** Restigouche

Type Of Deposit: Ice-Contact (Esker) **Parish:** Saint-Quentin

Exposure Type: Pit Face **NTS:** 21-0/11

Status: Inactive **UTM:** 217 705

Section Description & Comments:

This is the southernmost pit in the Kedgwick esker system. It is located immediately north of Five Finger Brook at Highway 17. At this point a small tributary esker converges with the main esker ridge. The material noted during the present visit was the coarsest material exposed in the esker. The amount of fines were also the highest of any esker pit. Material is horizontally bedded in the core of the esker with a slight visible dip to the south. Channel cross-bedding and lateral draping of beds were also observed in the faces.

Visual grain size estimate of exposed material indicates 15% >10.0 cm, 30% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 20% <0.5 cm, 10% fines.

The face is 8 m in height. D.O.T. testing (72-116) indicates excessive fines (to 42%) and the material would require crushing and washing for production of subbase. Three Los Angeles abrasion tests yielded 28.3, 24.4 and 24.4% losses.

Mechanical Analysis:

Sieve	50 mm	38.1 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
72-116	88	82	64	51	39	29		13			10.3	% PASSING
72-116	83	79	63	49	39	31		12			5.0	
		98.6	93.8	84.7	73.7	61.9	43.7	22.3	16.9	12.5	11.1	

Lithologic Analysis:

Unsound Lithotypes	% 50	Sound Lithotypes	% 50
Argillite	20%	Greywacke	25%
Siltstone	18	Sandstone	15
Sandstone	11	Argillite	6
Shale	1	Siltstone	3
		Quartzite	1

Estimate Of Reserves: (See 011-22)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 011-27 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 241 733

Section Description & Comments:

This is a large shallow pit off Highway 260 at Thibault. Pit faces expose 3 to 5 m of poorly sorted angular to subangular sandy coarse gravel. Sampling was only possible at the west side of the pit where materials were slightly finer grained. The material is crudely bedded.

Visual grain size estimates of faces: (west side) 20% >10.0 cm, 25% 10.0 cm to 25.0 cm, 20% 2.5 cm, 33% <0.5, 2% fines; (east side), 30% >10.0 cm, 25% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 25% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	94.8	87.1	74.2	53.1	22.4	4.7	1.2	0.4	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 82		Sound Lithotypes % 18	
Siltstone	53%	Greywacke	10%
Shale	16	Sandstone	8
Sandstone	13		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves m^3 probable
12	4	3	120 000

Location: 011-28 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 264 720

Section Description & Comments:

The deposit is a small area of ice-contact stratified drift on the side of a large hill. The deposit shows as a small rise and spreads beyond the mapped boundary of the feature as a thin veneer of material over bedrock. The material is a sandy coarse angular gravel. The gravel shows poor bedding and little evidence of sorting or rounding during deposition.

Visual grain size estimate of exposed faces: 30% >10.0 cm, 20% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 25% <0.5 cm (2% fines).

Mechanical Analysis: N.A.

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING										

Lithologic Analysis:

Unsound Lithotypes % 77		Sound Lithotypes % 23	
Siltstone	49%	Sandstone	15%
Sandstone	24	Greywacke	7
Shale	4	Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
14	12	8	960 000

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Location: 011-29 County: Restigouche

Type Of Deposit: Ablation Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

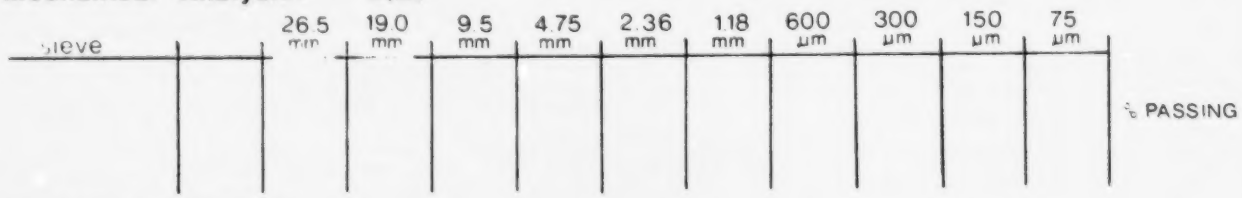
Status: Inactive UTM: 176 670

Section Description & Comments:

This is a small pit in an area of till plain and channel features adjacent to the creek valley. Several small exposures occur along the access road and in adjacent areas. Material in the pit is poorly bedded and many of the clasts are coated with fine material. Exposures are poor and faces are badly slumped. Approximately 10 m of material is exposed.

Visual estimate of exposures indicates: 5% >10.0 cm, 30% 10.0 cm to 25.0 cm, 30% 2.5 cm to 0.5 cm, 25% <0.5 cm (10% fines).

Mechanical Analysis: N.A.



Lithologic Analysis:

Unsound Lithotypes % 23		Sound Lithotypes % 77	
Greywacke	23%	Greywacke	76%
		Calcite	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

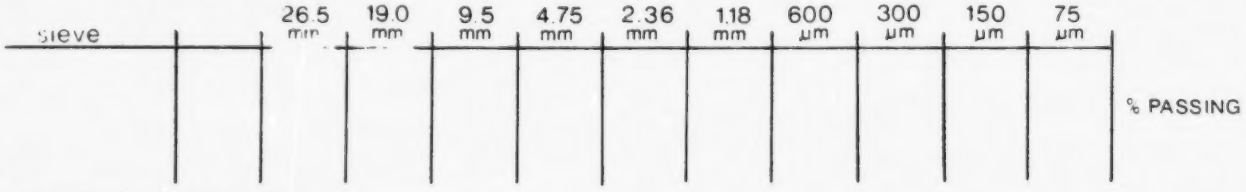
Location:	011-30	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/11
Status:	Inactive	**UTM:**	235 668

Section Description & Comments:

This pit is located in a narrow outwash terrace on the east side of Five Finger Brook. Rock outcrops along the access road suggest that the deposit is thin. Material consists of interbedded sandy medium gravel, beds of sand and occasional boulder concentrations. The deposit locally contains large quantities of fine material and is almost till-like in places. The material is suggestive of proximal facies outwash. An 8 m high face is present along the east side of the pit.

Visual estimate of grain size present in exposures: 15% >10.0 cm, 20% 10.cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 30% <0.5 cm (10% fines)

Mechanical Analysis: N.A.



Lithologic Analysis:

Unsound Lithotypes % 29		Sound Lithotypes % 71	
Siltstone	23%	Sandstone	25%
Sandstone	6	Siltstone	23
		Greywacke	21
		Quartz	2

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
6	1	5	50 000

Location: 011-31 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Active UTM: 233 659

Section Description & Comments:

The pit is located in an outwash terrace along the west side of Five Finger Brook. The material is being mined in two faces. The upper face is approximately 9 m in height and largely composed of fine to coarse sand with occasional gravel layers or stringers. Some parts of the deposit are quite silty. Sample B is from this unit. A lower bench has been recently opened up in the base of the pit. This bench exposes mainly clean gravelly coarse sand (Sample A).

Visual estimates of grain size from available lower exposures indicate: 15% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 60% <0.5 cm (0-5% fines).

D.O.T. has conducted testing of the property and adjacent lands (67-50). Fifteen Los Angeles abrasion test losses average approximately 22% and one typical grain size test is noted below. These results are from the upper bench only and do not typify the new lower bench. D.O.T. concludes that the grading of the materials will present significant problems with respect to compaction and frost heave.

Mechanical Analysis:

Sieve	31.8 mm	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
76-50	99	99	94	88	63			27			5.0	
Upper bench			100	99.7	98.2	94.7	85.5	67.4	26.6	7.9	3.0	% PASSING
Lower bench		94.3	93.6	89.6	85.4	76.9	58.0	20.0	2.1	0.6	0.3	

Lithologic Analysis:

Unsound Lithotypes % 29		Sound Lithotypes % 71	
Siltstone	16%	Greywacke	37%
Sandstone	9	Sandstone	16
Argillite	4	Argillite	9
		Siltstone	7
		Quartzite	1
		Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
7	3 (upper bench)	8	240 000
	2 (lower bench)	3	60 000
			300 000

Location: 011-32 **County:** Restigouche

Type Of Deposit: Ablation **Parish:** Saint-Quentin

Exposure Type: Pit Face **NTS:** 21-0/11

Status: Inactive **UTM:** 179 631

Section Description & Comments:

This is a small pit in an area of till showing a channelized surface. The exposure is similar to many road cuts in the area. Up to 4 m of sandy medium gravel is present overlying 1 to 3 m of stony silt till that overlies broken bedrock. All three materials have been extracted at the site. The bedding in the gravel is poorly developed and subangular to subrounded. Small pits elsewhere in the area are present on the edges of similar till highs. They are common in channelized areas but are generally very limited in both area and thickness.

Visual estimate of grain size in gravel exposure: 5% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 30% <0.5 cm (5% fines - variable).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		92.9	81.2	72.0	52.5	32.0	17.7	7.6	2.2	0.4	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 19		Sound Lithotypes % 81	
Greywacke	19%	Greywacke	81%

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
			Limited

Location: 011-33 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 249 634

Section Description & Comments:

The pit is located in an outwash deposit in a meltwater channel east of Saint-Quentin. Bedrock is present in the area and in the bottom of the pit. Faces are generally slumped but average approximately 8 m in height. The material varies from pebbly medium to coarse sand through sandy medium to coarse gravel. Several lenses of fine sand (up to 0.5 m thick) were noted.

Visual grain size estimate of exposed faces indicates: 15% >10.0 cm, 25% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 30% <0.5 cm (5% fines).

D.O.T. testing (67-51) indicates variable materials and a high content of fines. Further testing (D.O.T. 71-12) to the north of the pit indicates slightly better material. Los Angeles abrasion losses (2 samples, D.O.T. 67-51 and 71-12) are 29.4 and 28.0%.

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
67-51	79	63	51	40	23			10			8.2	% PASSING
71-12			78	62	46	36		22			8.1	

Lithologic Analysis:

Unsound Lithotypes % 33		Sound Lithotypes % 67	
Siltstone	20%	Greywacke	28%
Shale	7	Argillite	18
Sandstone	5	Sandstone	11
Calcite	1	Siltstone	9
		Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
8	3	8	240 000

Location:	011-34	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/11
Status:	Depleted	**UTM:**	249 630

Section Description & Comments:

The pit is located in an outwash deposit in a meltwater channel east of Saint-Quentin. Bedrock is present in the area and was observed at several places in the bottom of the pit. One exposed face at the south end of the pit contains 2.5 m of fine to medium sand with occasional coarse sand or sandy gravel lenses or beds. The bedrock surface in the pit bottom is irregular and the deposit thickness is similarly variable.

Mechanical Analysis: N.A.

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING										

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
			Depleted

Location: 011-35 County: Restigouche

Type Of Deposit: Ablation Parish: Eldon

Exposure Type: Pit Face NTS: 21-0/11

Status: Inactive UTM: 467 635

Section Description & Comments:

This is a small pit near Oxford Brook north of the Road to Resources. The pit is shallow and broken bedrock is exposed in the pit bottom. Clasts are moderately rounded and flat. Exposures are poor but zones of sandy material are visible in several areas of the pit. Maximum exposure is 2.5 m.

Visual estimate of grain size from exposures indicates: 5% >10.0 cm, 40% 10 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 20% <0.5 cm (0-5% fines).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
		93.8	89.8	70.6	44.2	20.0	6.3	2.3	0.8	0.4	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 41		Sound Lithotypes % 59	
Siltstone	30%	Siltstone	23%
Shale	4	Greywacke	16
Sandstone	4	Sandstone	12
Argillite	3	Argillite	8

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 012-1 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Pit/Road Cut **NTS:** 21-0/12

Status: Inactive **UTM:** 900 822

Section Description & Comments:

This pit is one of several small excavations along the road adjacent to Falls Brook. Several small outwash terraces are largely covered by the roadway. The material is sandy gravel. High fines were observed locally (to 10%). Bedding is not well developed and pebbles are subangular to subrounded. The exposure is 7 m in height.

Visual estimate of grain size from available exposures: 20% >10.0 cm, 25% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 25% <0.5 cm (fines variable 0 to 10%).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		93.4	91.2	80.1	63.6	44.3	25.6	11.4	5.0	2.9	1.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 75		Sound Lithotypes % 25	
Siltstone	49%	Siltstone	18%
Sandstone	14	Greywacke	7
Shale	7		
Greywacke	5		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		5	Limited

Location:	012-2	**County:**	Restigouche
Type Of Deposit:	Ice-Contact	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/12
Status:	Inactive	**UTM:**	006 818

Section Description & Comments:

This pit is excavated in the southwestern tip of a broad deglaciation feature of probable ice-contact or ablation origin at Eightmile Lake. The surface is hummocky and there are scattered rock outcrops within the deposit -- indicating a variable sediment thickness. The surface of the feature is suggestive of a ribbed moraine on the west side of the lake. Sedimentary structures exposed in the pits at the southern end of the deposit are strongly suggestive of a deltaic environment. Several metres of laminated silt were observed overlying the deltaic materials. Available exposure and morphology suggest that the majority of the granular material is present at the southern end of the deposit. The remainder of the deposit consists of thin ablation materials. Approximately 4 m of gravelly sand is exposed in the pit. Bedrock is exposed at the base of the excavation.

Visual grain size estimate from available exposure: 25% 2.5 cm to 0.5 cm, 75% <0.5 cm (up to 10% fines locally).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	99.1	96.7	89.5	74.6	53.9	17.5	5.4	3.1	2.5	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
230	30	5	1 500 000

Location: 012-3 **County:** Restigouche

Type Of Deposit: Ice-Contact **Parish:** Saint-Quentin

Exposure Type: Pit Face **NTS:** 21-0/12

Status: Inactive **UTM:** 015 820

Section Description & Comments:

This pit is located south of Eightmile Lake and is part of a broad deglaciation feature of probable ice-contact or ablation origin at Eightmile Lake. The surface is hummocky and there are scattered rock outcrops -- indicating variable sediment thickness. The surface of the feature appears ribbed to the west of the lake. Sedimentary structures exposed in the pit (10 m) are suggestive of a deltaic, ice front), environment. Several metres of laminated silt have been stripped from the surface of the deposit. Granular reserves appear to be concentrated in the pit vicinity -- the remainder of the deposit is thin and composed of ablation materials. Approximately 10 m of sandy gravel is exposed with bedding dipping at approximately 35° to the southwest. Occasional beds of sand to 30 cm thick are present in the sequence. Some graded bedding is visible.

Visual estimate of grain size from available exposures: 5% >10.0 cm, 30% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 25% <0.5 cm (0.5% fines).

The D.O.T. (78-82) investigated the pit and determined Los Angeles abrasion losses of 31.3 and 29.7% and aggregate soundness losses of 2.61 and 3.77% due to flaking and splitting of particles.

Mechanical Analysis:

Sieve	50 mm	31.8 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
78-82	87	79	66	47	34	26		11			2.8	% PASSING
78-82	86	76	64	42	22	12		5			2.0	
78-82	100	98	93	82	67	50		11			2.4	

Lithologic Analysis:

Unsound Lithotypes % 47		Sound Lithotypes % 53	
Argillite	17%	Greywacke	29%
Siltstone	16	Sandstone	14
Greywacke	5	Argillite	7
Shale	5	Siltstone	3
Sandstone	4		

Estimate Of Reserves: (See 012-2)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location: 012-4 County: Restigouche

Type Of Deposit: Outwash Parish: Grimmer

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 100 813

Section Description & Comments:

This is a small pit located on an outwash terrace approximately 5 m above the Kedgwick River at the Tracy Depot road crossing. Approximately 3 m of poorly sorted outwash gravel is exposed. There are numerous flat pebbles and the material shows horizontal bedding. A very minor fines content was observed and the material is uniform.

Visual estimate of grain size from available exposures: 15% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 25% <0.5 cm.

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	85.5	78.2	59.7	45.8	33.6	20.7	8.1	2.8	1.4	0.4	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 66		Sound Lithotypes % 34	
Siltstone	44%	Greywacke	18%
Sandstone	12	Siltstone	9
Greywacke	5	Sandstone	5
Shale	5	Quartzite	2

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
9	4	4	160 000

Location: 012-5 County: Madawaska

Type Of Deposit: Ancient Alluvium Parish: Riviere-Verte

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 836 748

Section Description & Comments:

This small pit is one of many shallow diggings along the Goumamitz River. This excavation is on a slightly elevated terrace and probably contains thicker material than much of the adjacent area. Many of the pebbles are shattered siltstone. Occasional rock outcrops are visible along the valley bottom. Approximately 3 m of sand and gravel is exposed.

Visual estimate of grain size from available exposures: 5% >10.0 cm, 25% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 40% <0.5 cm (locally fines can range to 10%).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	93.6	88.9	72.0	55.1	37.6	21.7	9.8	3.3	1.6	0.6	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 81		Sound Lithotypes % 19	
Siltstone	54%	Argillite	7%
Argillite	11	Sandstone	5
Shale	9	Siltstone	4
Sandstone	7	Greywacke	2
		Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
	Limited	0 to 3	Limited

Location: 012-6 County: Madawaska

Type Of Deposit: Ancient Alluvium Parish: Rivière-Verte

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 861 737

Section Description & Comments:

This is another small shallow pit (2.5 m) in materials classified as ancient alluvium. The deposit is thin and of irregular occurrence. It is close to the level of the Gounamitz River and there are occasional bedrock outcrops. Materials are commonly variable and may locally contain high fines. Materials exposed contain a large number of flat subangular to subrounded clasts composed of dark grey siltstone.

Visual estimates of grain size from available exposure: 20% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 45% <0.5 cm(generally minor fines, occasional clast >10 cm).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING	96.1	89.3	71.3	54.9	39.3	24.0	10.2	2.0	1.2	1.1

Lithologic Analysis:

Unsound Lithotypes % 72		Sound Lithotypes % 28	
Siltstone	41%	Sandstone	12%
Argillite	16	Greywacke	7
Sandstone	14	Argillite	4
Shale	1	Siltstone	4
		Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 012-7 County: Madawaska

Type Of Deposit: Outwash Parish: Rivière-Verte

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 882 735

Section Description & Comments:

This pit is located in a small pocket of outwash above the adjacent alluvial deposit. The face exposes 1 m of fine to medium sand over 4 m of sandy gravel. Many pebbles are flat in shape and subrounded. A coating of fines was noted on many of the pebbles.

Visual estimate of grain size from available exposures: 10% >10.0 cm, 10% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 35% <0.5 cm (5 to 10% fines).

Mechanical Analysis: N.A.

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
% PASSING										

Lithologic Analysis:

Unsound Lithotypes % 74		Sound Lithotypes % 26	
Siltstone	49%	Siltstone	14%
Greywacke	11	Greywacke	10
Sandstone	8	Quartzite	2
Shale	6		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
	Limited	4	Limited

Location: 012-8 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 906 733

Section Description & Comments:

This pit is a small exposure in a probable outwash terrace. The terrace has been eroded and has an irregular surface. The exposure displays approximately 5 m of sandy gravel. The maximum boulder size is 30.0 cm. The pebbles are flat and subrounded and the material contains some fines. The presence of near-surface bedrock is inferred -- this may reduce available reserves.

Visual estimate of grain size from available exposures: 15% >10.0 cm, 20% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 30% <0.5 cm.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	96.0	86.9	72.2	59.2	44.2	25.1	12.3	5.6	3.1	2.3	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 65		Sound Lithotypes % 35	
Siltstone	53%	Siltstone	18%
Sandstone	7	Greywacke	12
Shale	5	Sandstone	5

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
30	10	5	500 000

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Location: 012-9 County: Restigouche

Type Of Deposit: Ice-Contact Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/12

Status: Inactive UTM: 941 741

Section Description & Comments:

This pit is developed in a terrace-like feature on the side of a bedrock valley. It is noted as ice-contact material on the basis of highly variable texture and disturbed bedding. The material varies from medium gravel to silt and is often interbedded. Face height is 3 m.

Visual estimate of grain size in exposures: 20% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 35% <0.6 cm (highly variable fines content).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	94.3	92.6	82.2	70.5	59.3	49.2	37.7	12.1	2.5	1.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 96		Sound Lithotypes % 4	
Shale	56%	Siltstone	2%
Siltstone	34	Sandstone	2
Sandstone	6		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
6			Limited

Location: 012-10 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Road Cut NTS: 21-0/12

Status: Undeveloped UTM: 010 704

Section Description & Comments:

The sample was taken from a 2 m road cut in a meltwater drainage channel. The general morphology suggests that there may be pockets of sand overlying the bedrock in the valley of Dead Brook to the northeast of the sample site.

Visual estimate of grain size from exposure: 20% 2.5 cm to 0.5 cm, 80% <0.5 cm (approximately 5% fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		100	98.2	94.4	88.4	80.1	64.9	30.9	12.8	3.9	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
			Extensive area but very thin

Location:	012-11	**County:**	Madawaska
Type Of Deposit:	Outwash	**Parish:**	Rivière-Verte
Exposure Type:	Pit Face	**NTS:**	21-0/12
Status:	Inactive	**UTM:**	830 685

Section Description & Comments:

Deposit 012-11 is typical of a number of similar small deposits along the Right Hand Branch of Falls Brook. The deposits are each very small but their relative abundance and proximity to the road may prove significant. They are particularly abundant between UTM Eastings 81 and 87. Most of the gravel occurrences appear to be of outwash origin, although there are some occurrences of ablation materials. Bedrock outcrops are common and gravel thicknesses range generally from 2 to 6 m. Areas seldom exceed 1000 m² (including the roadway in many cases). The presence of these deposits suggests that the Falls Brook - Alex Brook bedrock valley conducted a significant amount of meltwater during deglaciation. Five metres of sandy gravel is exposed at 012-11. Bedding and cross-bedding are common but chaotic, and do not display a consistent current direction.

Visual estimate of grain size from exposures: 10% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 50% <0.5 cm (fines variable 2 to 10%).

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	98.1	96.8	87.7	68.2	49.5	33.4	25.8	15.3	7.2	3.9	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 92		Sound Lithotypes % 8	
Siltstone	58%	Sandstone	6%
Sandstone	30	Greywacke	1
Argillite	4	Siltstone	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 012-12 County: Madawaska

Type Of Deposit: Outwash Parish: Sainte-Anne

Exposure Type: Pit Face NTS: 21-0/12, 21-0/5

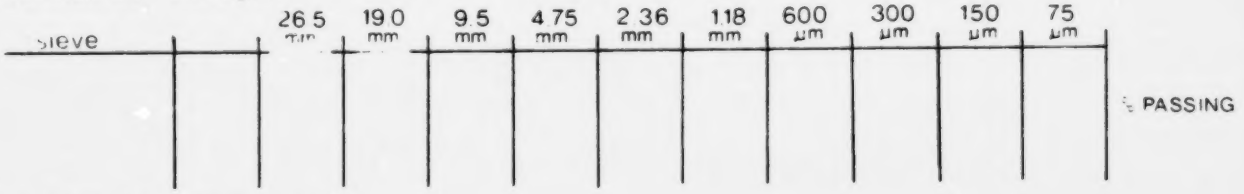
Status: Inactive UTM: 886 620

Section Description & Comments:

This pit is located in a small but well-developed terrace along the Cedar Brook. The excavation exposes 3 m of crudely bedded sandy medium gravel over 0.5 m medium sand. The bedding of the gravel is horizontal and uniform. There are numerous flat subangular to subrounded boulders.

Visual estimate of grain size from exposures: 30% >10.0 cm, 30% 10.0 cm to 2.5 cm, 20% 2.5 cm to 0.5 cm, 20% <0.5 cm (5% fines).

Mechanical Analysis: N.A.



Lithologic Analysis:

Unsound Lithotypes % 85		Sound Lithotypes % 15	
Siltstone	62%	Greywacke	8%
Sandstone	13	Sandstone	5
Argillite	9	Siltstone	1
Shale	1	Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)		Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
21-0/12	15	7	3	210 000
21-0/5	2	-	-	-

Location:	012-13	**County:**	Madawaska
Type Of Deposit:	Ice-Contact	**Parish:**	Sainte-Anne
Exposure Type:	Pit Face	**NTS:**	21-0/12
Status:	Inactive	**UTM:**	923 626

Section Description & Comments:

Pit 012-13 is developed in a small ridge of possible ice-contact origin. Sedimentary bedding is nearly horizontal and does not indicate an esker but the geomorphic form is similar to a short broad esker feature. There is a large amount of broken siltstone on exposed surfaces. Total exposure consists of approximately 6 m of sandy medium gravel with occasional lenses of medium to coarse sand to 40 cm thick. The pebbles are generally subangular to subrounded.

Visual grain size estimate from available exposures: 10% >10.0 cm, 30% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 30% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		95.3	89.3	70.5	49.7	33.1	19.8	9.9	4.6	2.4	0.6	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 93		Sound Lithotypes % 7	
Siltstone	67%	Greywacke	3%
Sandstone	11	Sandstone	3
Argillite	9	Quartz	1
Shale	6		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
12	6	6	360 000

Location: 013-1 County: Restigouche

Type Of Deposit: Ablation Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/13

Status: Inactive UTM: 981 044

Section Description & Comments:

The pit is located in an ablation feature situated across the McDougall Brook Valley. This valley "dam" exposes a large amount of ablation till with pockets of glaciofluvial materials such as those exposed in the pit. The surface of the feature is hummocky and bedrock is exposed in the immediate vicinity. Much of the material exposed in the pit is uniform but the thickness and the grain size of the material are expected to vary widely within the overall deposit. Approximately 10 m of sandy gravel is exposed.

Visual estimate of grain size from available exposure:
25% > 10.0 cm, 35% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 10% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	83.5	72.1	45.4	26.8	14.5	7.0	3.8	2.5	1.6	0.4	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 89		Sound Lithotypes % 11	
Siltstone	61%	Sandstone	4%
Sandstone	14	Siltstone	3
Shale	9	Greywacke	2
Argillite	5	Argillite	2

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m3) probable
56	50	4	200 000 000

Location: 013-2 County: Restigouche

Type Of Deposit: Ablation Parish: Saint-Quentin

Exposure Type: Road Cut NTS: 21-0/13

Status: Undeveloped UTM: 034 067

Section Description & Comments:

This site is an unopened road cut in low valley area. Exposure shows approximately 1 m of gravel overlying silty sand till. The gravel becomes more sandy with depth. Geological associations suggest that the gravel is a pocket within ablation till. Pebbles are flat and moderately rounded.

Visual estimate of overall grain size from available exposure:
45% 10.0 cm to 2.5 cm, 40% 2.5 cm to 0.5 cm, 15% <0.5 cm (minor fines), occasional clast >10.0 cm.

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
		89.9	74.6	58.4	45.4	36.3	23.3	14.5	9.2	3.9	1.0	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 85		Sound Lithotypes % 15	
Siltstone	46%	Greywacke	8%
Shale	18	Sandstone	4
Argillite	16	Argillite	3
Sandstone	5		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		1	Limited

Location: 013-3 County: Restigouche

Type Of Deposit: Ancient Alluvium Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/13

Status: Depleted UTM: 797 013

Section Description & Comments:

This pit is located in the upper portion of small alluvial terrace. The terrace is being used as a lumber camp (Fraser #28) and there are several shallow excavations. Approximately 1 to 2 m of medium sand overlies up to 3 m of laminated silt. The silt occurs in several areas in this portion of the river valley.

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
		100	99.6	99.3	95.8	76.5	37.9	11.2	2.6	0.9	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		1	Limited

Location: 013-4 **County:** Restigouche

Type Of Deposit: Ice-Contact **Parish:** Saint-Quentin

Exposure Type: Pit Face **NTS:** 21-0/13

Status: Inactive **UTM:** 766 974

Section Description & Comments:

The pit is developed in a zone of thicker material within an area of thin sandy outwash. There may be similar but smaller deposits in the same valley. The deposit is an elongated hummocky mound cut by the Fifteen Mile Brook. Pebbles are moderately well rounded. Sorting is good. The material is a sandy gravel and achieves a maximum thickness of 14 m.

Visual estimate of grain size from exposures:
10% >10.0 cm, 35% 10.0 cm to 2.5 cm, 30% 2.5 cm, 25% <0.5 m (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm
% PASSING	89.5	80.2	65.4	52.8	38.8	24.1	12.6	5.7	1.3	0.4

Lithologic Analysis:

Unsound Lithotypes % 70		Sound Lithotypes % 30	
Sandstone	33%	Sandstone	20%
Siltstone	27	Greywacke	2
Shale	7	Quartzite	2
Granite	2	Granite	2
Volcanic	1	Quartz	2
		Argillite	1
		Volcanic	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable (m^3) probable Reserves
14	10	8	800 000

Location: 013-5 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Pit Face **NTS:** 21-0/13

Status: Inactive **UTM:** 796 967

Section Description & Comments:

This deposit is a small high level outwash deposit adjacent to the South Branch of the Kedgwick River. The outwash has an eroded but horizontal upper surface and overlies an irregular bedrock surface. Up to 4 m of sandy gravel is exposed. There is no bedrock exposed in the pit but there are outcrops nearby. The material is horizontally bedded and the pebbles are commonly subrounded with a flat shape. The material is uniform throughout.

Visual estimate of grain size from available exposures: 5% >10.0 cm, 40% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 25% <0.5 cm (minor fines)

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
		94.9	85.7	66.3	47.7	30.0	14.7	4.7	1.5	0.3	0.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 68		Sound Lithotypes % 32	
Siltstone	49%	Greywacke	23%
Greywacke	9	Siltstone	5
Sandstone	5	Sandstone	3
Shale	5	Quartz	1

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
18	18	4	720 000

Location: 013-6 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Saint-Quentin

Exposure Type: Hand dug pit **NTS:** 21-0/13

Status: Undeveloped **UTM:** 859 932

Section Description & Comments:

013-6 is a small outwash deposit within the large bedrock valley containing Clearwater Lake. The material is generally sandy gravel ranging up to 3 or 4 m in thickness but more commonly 1 to 2 m. Bedrock occurs beneath the gravel in several exposures. Pebbles are moderately to well rounded. Locally the materials contain high fines (5 to 10%).

Visual estimate of grain size from several exposures: 40% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 25% <0.5 cm (variable fines).

Mechanical Analysis:

sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		92.8	89.5	74.0	58.2	41.7	25.9	9.7	2.1	0.2	0.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 60		Sound Lithotypes % 40	
Siltstone	39%	Greywacke	21%
Greywacke	10	Siltstone	14
Shale	9	Sandstone	5
Sandstone	2		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Limited

Location: 013-7 County: Restigouche

Type Of Deposit: Outwash Parish: Saint-Quentin

Exposure Type: Pit Face NTS: 21-0/13

Status: Inactive UTM: 947 963

Section Description & Comments:

The pit is located on the edge of a terraced outwash deposit. Approximately 12 m of medium to coarse gravel is exposed with beds and lenses (to 10 cm thick) of sand. The upper 4 m of material is dominantly in the 10 cm to 2.5 cm size range. The bedding is contorted in much of the exposure.

The 12 m face described is excavated partially into a higher level terrace (largely depleted) -- a more representative thickness (5 m) is used as a thickness to calculate the reserves in the main terrace.

Visual estimate of overall grain size from available exposures: 15% >10.0 cm, 50% 10.0 cm to 1.5 cm, 20% 2.5 cm to 0.5 cm, 15% ≤0.5 cm (minor fines), maximum size to ±0.5 m.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	94.3	90.2	69.3	47.2	23.4	8.5	2.6	1.2	0.6	0.3	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 55		Sound Lithotypes % 45	
Siltstone	24%	Greywacke	23%
Argillite	16	Argillite	13
Greywacke	7	Sandstone	7
Sandstone	7	Siltstone	2
Shale	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
24	24	5	1 200 000

Location:	013-8	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/13
Status:	Inactive	**UTM:**	942 955

Section Description & Comments:

This is one of four pits in outwash material along the Kedgwick River at Rapids Depot. A general average thickness of 5 m of material is assigned although there are several terrace levels. Much of the available material is presently covered by the road and the Rapids Depot Lumber Camp.

Approximately 3 m of sandy gravel is exposed. Additional materials are likely beneath the present pit floor. Pebbles are commonly subrounded and flat.

Visual estimates of grain size in this portion of the deposit: 5% >10.0 cm, 15% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 35% <0.5 cm.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	97.3	93.7	82.1	69.4	55.2	34.7	15.8	3.5	0.9	0.4	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 37		Sound Lithotypes % 63	
Sandstone	18%	Sandstone	31%
Siltstone	13	Greywacke	28
Greywacke	3	Quartz	4
Argillite			

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
20	5	5	250 000

Location:	013-9	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/13
Status:	Inactive	**UTM:**	944 950

Section Description & Comments:

The general description of this deposit is presented in 013-8.

Approximately 3 m of sand with minor gravel is exposed in this pit. Much of the material has been removed from this portion of the deposit. Up to 10% >0.5 cm was noted and local concentrations of fines were observed. The material is generally uniform.

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
			100	98.8	93.8	80.2	50.9	15.8	3.2	0.8	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves: (see 013-8)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable

Location:	013-10	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Saint-Quentin
Exposure Type:	Pit Face	**NTS:**	21-0/13
Status:	Inactive	**UTM:**	945 944

Section Description & Comments:

The general description of this deposit is presented in 013-8.

Approximately 2 m of sandy gravel is presently exposed in the pit and the pit area is largely depleted. Pebbles are commonly subrounded and both round and flat shapes were observed. Lithologic analyses suggest a petrographic quality somewhat better than regional values.

Visual estimate of grain size from available exposures: 5% >10.0 cm, 30% 10.0 cm to 2.5 cm, 35% 2.5 cm to 0.5 cm, 30% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	98.8	94.5	78.4	63.3	46.0	29.7	13.3	1.7	0.5	0.3	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 41		Sound Lithotypes % 59	
Sandstone	19%	Sandstone	34%
Siltstone	13	Greywacke	25
Argillite	6		
Greywacke	2		
Shale	1		

Estimate Of Reserves: (See 013-8)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable

Location: 014-1 County: Restigouche

Type Of Deposit: Outwash Parish: Eldon

Exposure Type: Pit Face NTS: 21-0/15 & 14

Status: Inactive UTM: 497 067

Section Description & Comments:

This pit is previously described by Finamore (1979) as site 015-35. New exposure plus hand dug test pits indicate 2 to 3 m of sandy medium gravel overlies approximately 10 m of brown silt with occasional pebbles. This new information significantly reduces the recoverable reserves estimate. Sample data are quoted from the previous report.

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	118 mm	600 µm	300 µm	150 µm	75 µm	
	a	73	66	49	37	27	21	17	15	11	5.2	% PASSING
% passing	b				100	73	57	46	41	30	13.9	

Lithologic Analysis:

Unsound Lithotypes % 33	Sound Lithotypes % 67
schist, shale, friable clasts 30; soft sandstone 1; calcite 2	sandstone and siltstone 28; metasediments 6; limestone 13; argillaceous limestone 20

Estimate Of Reserves: (21-0/14 portion only)

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
1	1	2	20 000

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Location: 014-2 **County:** Restigouche

Type Of Deposit: Ancient Allivium **Parish:** Eldon

Exposure Type: River Cut **NTS:** 21-0/14

Status: Undeveloped **UTM:** 245 037

Section Description & Comments:

This site is a small river cut on low-level terrace. Approximately 3 m of material is exposed in the cut. Medium sand is the dominant material but it is variable and contains numerous bands or lenses of gravel and scattered boulders throughout the deposit. There are high concentrations of fines locally.

Mechanical Analysis:

sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
				100	99.7	99.2	95.7	30.2	11.0	3.7	% PASSING

Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
28		3	Significant area but high water table and flood-prone

Location: 014-3 **County:** Restigouche

Type Of Deposit: Ice-Contact (Esker) **Parish:** Eldon

Exposure Type: Road Cut **NTS:** 21-0/4

Status: Undeveloped **UTM:** 443 019

Section Description & Comments:

The sample site is a road cut in the western end of an esker. The esker is on the side of a bedrock valley with rock exposed above and below the feature. An apron deposit of 1-2 m of sand, gravel and sandy till is present. Maximum relief observed on the esker is approximately 5 m. Bedrock was observed beneath the flank deposits and beneath the esker core. Four m of sandy medium gravel was exposed over 4 m badly weathered siltstone in the road cut. The cut contained poor horizontal bedding with occasional open framework gravel layers. Pebbles were subrounded to rounded and a large proportion of siltstone and shale pebbles were observed in the cut.

Visual estimate of grain size: 5% >10.0 cm, 25% 10.0 cm to 2.5 cm, 45% 2.5 cm to 0.5 cm, 25% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		97.8	89.8	62.4	39.2	24.0	15.3	8.5	3.9	1.2	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 67		Sound Lithotypes % 33	
Shale	35%	Siltstone	26%
Siltstone	27	Greywacke	6
Greywacke	4	Quartz	1
Quartz	1		

Estimate Of Reserves: Esker core only

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
14	14	4	560 000

Location: 014-4 **County:** Restigouche

Type Of Deposit: Ablation **Parish:** Eldon

Exposure Type: Pit Face **NTS:** 21-0/14

Status: Inactive **UTM:** 463 002

Section Description & Comments:

The section is in a small pit adjacent to Highway 17. Approximately 4 m of highly variable material is exposed -- it ranges from well-sorted open framework gravel to stony sandy silt till within the exposed face. The material exhibits crude stratification throughout and the upper 1 to 2 m appears strongly oxidized and weathered.

Visual grain size estimates of exposed material: 10% >10.0 cm, 10% 10.0 cm to 2.5 cm, 50% 2.5 cm to 0.5 cm, 15% <0.5 cm, 15% fines.

The sample was taken from well sorted material.

Mechanical Analysis:

Sieve		26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
		97.8	93.5	70.9	54.2	40.2	28.3	15.5	6.7	3.2	1.1	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 97		Sound Lithotypes % 3	
Siltstone	89%	Siltstone	2%
Shale	7	Sandstone	1
Volcanic	1		

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
		Irregular	Limited

Location: 014-5 County: Restigouche

Type Of Deposit: Outwash Parish: Eldon

Exposure Type: Pit Face NTS: 21-0/14

Status: Inactive UTM: 349 942

Section Description & Comments:

The section is a large shallow pit with bedrock exposed at the base of the pit. Bedrock is also exposed in an adjacent railroad cut. A maximum of 3 m of gravel is exposed with an average thickness of approximately 2 m. The material exposed is a sandy medium to coarse gravel. It is poorly sorted and contains poorly developed horizontal bedding.

Visual grain size estimate from exposed faces: 30% >10.0 cm, 20% 10.0 cm to 2.5 cm, 25% 2.5 cm to 0.5 cm, 25% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	94.9	79.4	58.2	36.7	17.0	5.7	2.0	0.7	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 66		Sound Lithotypes % 34	
Siltstone	52%	Sandstone	13%
Sandstone	10	Argillite	10
Shale	3	Greywacke	7
Schist	1	Siltstone	4

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m³) probable
12	2	2	40 000

Location: 014-6 **County:** Restigouche

Type Of Deposit: Outwash **Parish:** Eldon

Exposure Type: Pit Face **NTS:** 21-0/14

Status: Active **UTM:** 325 935

Section Description & Comments:

The section is in a newly excavated pit near the C.N.R. line. The exposed gravel is coarse and contains numerous angular boulders. Approximately 10 m of poorly exposed material is present in the pit. Broken bedrock may be included in the material, which has been bulldozed into stock piles.

Visual estimate of grain size from exposure: 25% >10.0 cm, 25% 10.0 cm to 2.5 cm, 30% 2.5 cm to 0.5 cm, 20% <0.5 cm (minor fines).

Mechanical Analysis:

Sieve	26.5 mm	19.0 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm	
	100	97.1	81.8	66.4	45.2	16.2	3.6	1.2	0.7	0.2	% PASSING

Lithologic Analysis:

Unsound Lithotypes % 65		Sound Lithotypes % 35	
Siltstone	35%	Siltstone	18%
Greywacke	22	Greywacke	16
Sandstone	4	Sandstone	1
Shale	4		

Estimate Of Reserves:

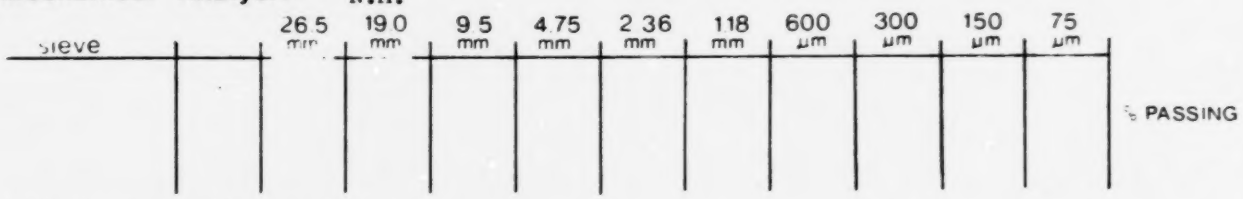
Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
7	7	8	560 000

Location:	014-7	**County:**	Restigouche
Type Of Deposit:	Outwash	**Parish:**	Eldon
Exposure Type:	Pit Face	**NTS:**	21-0/14
Status:	Active	**UTM:**	341 913

Section Description & Comments:

The outwash material is exposed in several road cuts and excavations, including a small pit, in and around St.-Jean-Baptiste-de-Restigouche. Much of the deposit is either built over or has recently been removed for highway construction. Up to 2 m of sandy medium gravel is exposed overlying irregular bedrock hummocks.

Mechanical Analysis: N.A.



Lithologic Analysis: N.A.

Unsound Lithotypes %	Sound Lithotypes %

Estimate Of Reserves:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (meters)	Recoverable Reserves (m^3) probable
			Depleted.

APPENDIX B

Supplementary Observations

SUPPLEMENTARY OBSERVATIONS

21 N/16 WILD GOOSE LAKE (PLATE 86-1)

N16-101 UTM 600021

Small stream crossing road to join Twenty-Seven Mile Brook. 2 m of sandy gravel is exposed. This is typical of several occurrences in the area along the South Branch of the Kedgwick River.

N16-102 UTM 653018

Small road cut which typifies much of the valley area. 2 m of sand and gravel over exposed bedrock. Most of the granular material in the valley is similar -- thin and underlain by rock. Although thicker areas of granular material may exist, the area is not considered a resource.

N16-103 UTM 515000

A new road cut several hundred metres in length exposes a fresh sandy silt to silty sand till. This is one of the best exposures of till in the area.

N16-104 UTM 510924

A small roadside exposure of sandy gravel. The material appears to be a small pocket of outwash.

N16-105 UTM 525892

Two small patches of very gravelly sand till occur in the valley. The surface topography is noticeably hummocky and supports unusually good tree growth. Gravel is very angular. Probable ablation or ice-contact origin.

21-O/5 GRAND RIVER (PLATE 86-2)

05-101 UTM 896592

Small road cut exposing 7 m of gravelly medium to coarse sand. The material is of possible outwash origin.

05-102 UTM 053608

Site 05-102 is a good exposure of stony sandy silt till. The till is thicker than normal for the area, and it is relatively fresh and unweathered. The till exposed is lodgement facies rather than the more common ablation till.

05-103 UTM 892565

Site 05-103 is in the valley of the Cedar Brook. Approximately 2 m of fine gravelly sand overlies stony silty sand till at the site. Other observations in the area indicate 1 to 2 m of stony silty sand till over the bedrock.

05-104 UTM 904518

Site 05-104 is a small pit in a mound of sand and sandy gravel of probable ice-contact origin. Approximately 2 m of this poorly sorted material overlies bedrock. This site is representative of similar features in the area which are part of an overall veneer of 1 to 3 m of ablation - ice-contact material.

05-105 UTM 073520

Site 05-105 is an observation pertaining to several shallow excavations near the Right Hand Branch Jardine Brook. Three sites expose 2 to 3 m of gravelly sand and two of these excavations encounter stony sand till below the outwash material. The sand occurs as a thin patchy veneer over the till in this portion of the valley. Bedrock has been excavated to construct the road at the brook crossing.

05-106 UTM 775513

Observation 05-106 is to identify a large area of probable ablation materials south of Quisibis Mountain. Hummocky and ribbed materials are visible on the aerial photographs between Quisibis Mountain and Larry Brook. The area is inaccessible but the analyses quoted for Deposit 05-5 should give an indication of the physical properties of the material. The surface appearance is similar to Deposit 05-3 to the east. No deposit is outlined because of the lack of data, but this area would be a good prospecting target for granular materials. Rampton et al. (1984) have termed this feature the Quisibis Mountain Moraine.

05-107 UTM 835465

Observation 05-107 identifies another area of probable ablation material. Road cuts of up to 3.5 m of sandy gravel are present but much of the exposed material is till. Thicknesses are expected to be highly irregular and seldom more than 3 m.

05-108 UTM 821449

Observation 05-108 is a recent road cut exposing approximately 3.5 m of poorly sorted sandy gravel. Several other cuts, within a kilometre along the road, expose up to 1.3 m stony sandy silt till. These exposures are typical of the patchy ablation material present in the area.

05-109 UTM 801417

Observation 05-109 describes one of numerous small pits along the Siegas River. The pit exposes 3 m of uniform sandy outwash gravel.

05-110 UTM 801414

This is a new pit in an outwash terrace similar to the one noted in 05-109. A clean well-exposed face shows 3.5 m of well rounded, horizontally bedded sandy medium gravel.

05-111 UTM 779365

Observation 05-111 is one of several very small shallow depleted or nearly depleted pits in the thin outwash of the Quisibis Lake meltwater channel. Approximately 2 m of silty sandy gravel is exposed.

05-112 UTM 882412

Observation 05-112 is a probable small esker located on a bedrock ridge parallel to Wagan Brook. The area is inaccessible and the feature was interpreted from aerial photographs. The similarity of this esker to others in the area would suggest a total height of 5 to 7 m and a width of 10 to 15 m. Possible extensions exist to the north and south of the feature noted on the map. The esker is an exploration target for granular material in the area.

05-113 UTM 906340

Observation 05-113 denotes a pocket of 5 m of medium to fine sand. There are some silt layers present and there is some fine gravel draped over the flanks of the sand. This is one of several areas of ice-contact or ablation material near Beaver Brook. The presence of these materials suggests some ice-damming phenomenon in the area during deglaciation.

05-114 UTM 924357

Observation 05-114 identifies another of the ice-contact or ablation deposit near Beaver Brook. Recent road construction has exposed 5 m of stony silty sand till containing lenses of sandy gravel. Directly across Beaver Brook to the north, 3 m of silty sand with gravel and boulders overlies 1 m of sandy silt till of probable ablation origin.

05-115 UTM 054400

Observation 05-115 is a road cut in a small ridge of stony sandy till. The till is of probable ablation origin and the presence of four ridge fragments stretching across the Little River valley in two places suggests two small cross-valley moraines cut by modern erosion. A small pit is present on the south side of the southern moraine which exposes a local pocket of gravelly sand outwash (6 m).

05-116 UTM 089413

Observation 05-116 is a small borrow pit with a 3 m face of stony sand till. Clasts in the till are noticeably angular.

21-O/11 KEDGWICK (PLATE 86-3)

011-101 UTM 243826

The site is clearly visible on the aerial photographs as a sequence of parallel ridges stepping down the side of a large rock-cored hill. Examination in the field revealed several road cuts through the rib sequence revealing up to 2 m of stony sandy silt till in each ridge. The top of each ridge is flat and an eroded channel appears on the uphill side of each ridge. The ridges are 10 to 15 m in width with approximately 5 m difference in elevation between each ridge. The channels are 10 to 15 m wide and have flat bottoms at 3 to 4 m below the crest of the ridge. Up to 0.8 m of dirty gravelly sand was noted in one of the channels and a small pit exposes a mixture of stony till, gravel and sand.

011-102 UTM 295819

Small pit exposure -- 3 m sandy medium gravel. Test holes by the D.O.T. (77-35) confirm the limited southerly extent of this deposit.

011-103 UTM 169802

Road cut in area displaying channelized surface topography. 2 m of loose stony sand till. Clasts are subangular.

011-104 UTM 216804

A 2 m ditch cut showing variable ablation material. Over a distance of approximately 20 m, stony sandy silt till grades laterally into silty sandy medium gravel. Several other shallow cuts in the area show ablation material which is highly variable in texture and thickness.

011-105 UTM 350813

Small exposure typical of many along the many abandoned meltwater channels in the area. 2 m sandy medium gravel.

011-106 UTM 245766

One of many small exposures in an area of ablation material. These exposures indicate a consistent thickness of approximately 4 m of highly variable materials ranging from stony sand till to silty sandy gravel.

011-107 UTM 250788

An overgrown and depleted pit. 3 m of dirty sandy gravel to gravelly sand is exposed. The Kedgwick municipal well field is located nearby.

011-108 UTM 258763

A small roadside pit. 5 m sandy medium gravel, moderately well sorted with subrounded to subangular clasts is exposed.

011-109 UTM 184698

A small exposure in a raised area of probable ablation material. The exposure is a small regraded pit. 3 m very stony sand till are present.

011-110 UTM 183683

A road cut cuts through a small esker. 3 m of sandy gravel with angular to subangular clasts is exposed in the esker overlying bedrock. The esker is approximately 30-50 m wide. Less than 1 m of stony till is present over bedrock on either side of the feature.

011-011 UTM 237671

Small borrow pit in hillside above outwash gravel pit. 1.5 m stony silt till over weathered crumbly shale.

011-112 UTM 236656

Abandoned pit along laneway. 8 m of sandy medium gravel overlying irregular hummocky bedrock surface.

011-113 UTM 239657

Former gravel pit that has been regraded and rehabilitated. 8 m of sandy medium gravel overlies an irregular weathered bedrock surface.

011-114 UTM 292650

Small borrow pit in bedrock terrain. 2 m stony silty sand till with poorly developed horizontal bedding and numerous angular to subangular clasts. A good example of ablation till. Bedrock is exposed in pit bottom and walls.

011-115 UTM 176633

Small road cut and dugout. 2 m stony sandy silt till.

21-O/12 GOUNAMITZ RIVER (PLATE 86-4)

012-101 UTM 801784

Small excavation in ancient alluvium showing 1 m of sandy gravel overlying bedrock. Up to 3 m of gravel are present in pockets and there are several rock outcrops at surface.

012-102 UTM 821807

Small road cut in ablation till. The till is up to 2 m in thickness and approximately equal parts of gravel and sand. The material appears partially washed and is probably an ablation till. A lithologic analysis was conducted with results as follows:

Unsound Lithotypes (65%)	
Siltstone	57%
Sandstone	4%
Greywacke	4%

Sound Lithotypes (35%)	
Siltstone	26%
Greywacke	5%
Sandstone	3%
Quartz	1%

012-103 UTM 949710

This site is a bedrock exposure in the Gounamitz River bed near the intersection of Falls Brook. A bedrock fall is present in the river bed (approximately 1.7 m in height). Several potholes up to 1.9 m in diameter are developed in the bedrock surface. They are clearly visible at low water periods. The potholes are developed in the siltstones of the Temiscouata Formation.

012-104 UTM 774621

Observation 012-104 has been recorded to note an area of probable ablation material. Access is poor and exposure is minimal but several hand dug test pits indicate a minimum of 1 m sandy ablation till. Interpretation of aerial photographs indicates the potential for areas of sorted granular material within the hummocky area.

21-O/13 STATES BROOK (PLATE 86-5)

013-101 UTM 816058

Small road cut and hand dug test pit on road south of Kedgwick Forks. Approximately 1.5 m of gravelly sand till is exposed on the side of a bedrock-cored hill. The till contains an exceptionally high content of unsound shale, sandstone and siltstone pebbles (estimated 80%). Most of the pebbles are flat and angular. This material is typical of many small shallow till deposits in the area.

013-102 UTM 944073

Small road cut in ablation material which has formed a partial dam in the bedrock valley of the States Lake and McDougall Lake branches of the States Brook. The "ablation dam" is similar to several others in the study area and forms a drainage divide between the two branches. Bedrock is exposed along both sides of the valley occupied by States and McDougall lakes. Approximately 2 m of gravelly sandy silt till is exposed.

013-103 UTM 994075

This observation point is located in a broad low area with hummocky relief. There is no access to the area but interpretation of aerial photographs suggests the presence of glaciofluvial deposits in the area. The regional geology would suggest that the material would be variable in composition and thickness. It is similar to deposit N16-3 in the adjacent Wild Goose Lake map sheet. This area is a good exploration target for moderate to small quantities of aggregate.

013-104 UTM 826001

This is an observation point to note the presence of a small ablation feature -- possibly a small moraine or kame. It is

presently inaccessible. Interpretation of aerial photographs and local geological patterns suggest the small hummocky zone on the bedrock hillside may contain up to 5 m of partially sorted ablation till.

013-105 UTM 051013

A shallow deposit of sand and probable sandy ablation till that has been almost totally depleted for road construction. The material contains more than 10% fines and varies from 0 to 2 m in thickness. The material is draped over an irregular bedrock surface.

21-0/14 MENNEVAL (PLATE 86-6)

0 14-101 UTM 471090

River cut in an alluvial terrace, 3 m silty fine sand with occasional pebbles and gravel lenses, bedrock outcrops present in river bank.

0 14-102 UTM 493076

River cut in an alluvial terrace, 3 m silty fine to coarse sand, bedrock outcrops in river bed.

0 14-103 UTM 342915

Several shallow exposures in area of the fire hall, school and baseball diamond at St-Jean-Baptiste-de-Restigouche. Maximum of 1.8 m sandy medium gravel in the vicinity of old depleted pit.

APPENDIX C

Explanatory Notes

MAPS

The accompanying maps show the locations of potential aggregate sources. These deposits are generally smaller than those shown by Gauthier (1982) or Rampton et al. (1984). Many of the thin deposits, such as sand outwash and ablation veneers, which are identified by those authors, are not considered aggregate resources in this report. Similarly, many deposits and details which are recorded in the present study are too detailed to appear in those works.

The identification of deposits is restricted to those that are accessible and those that are positively identified on air photographs (such as outwash or alluvial terraces). Most of the area is heavily forested or has been lumbered and features are obscured by vegetation. The nature of the materials and the underlying bedrock also limits the amount of detail obtainable from airphoto analysis. It is probable that new surficial features will be proven as new lands are cleared and new roads built. Some of these features may contain useable aggregates. Several potential sources have been identified as "Supplementary Observations" (Appendix B) and are noted as good exploration targets.

Data sources such as Gauthier (1982, 1983) and Rampton et al. (1984) provided a good preliminary working base for the present survey. D.O.T. pit information, quarry permits and water well data were all used to locate and evaluate deposits. In the field all passable roads were travelled by car and four wheel drive vehicles. Road cuts and natural exposures were examined. All known pits were examined. The map units were established using airphoto interpretation and the data obtained from the field survey.

The "grading diagrams" shown on the maps are summaries of the data obtained in the present survey. They are intended to give a capsule description (Appendix A) of the pit. The reader is referred to the pit description for a more detailed assessment. Overburden thickness, face heights and percentages of unsound lithologies were obtained from the present survey. The percentages of material <4.75 mm and <75 um were taken from laboratory analyses conducted from the present study, from D.O.T. data and, where those were not available, from field estimates.

PIT REPORTS

The following passage is a brief explanation of the terms and format used on the accompanying pit/deposit forms. The descriptions employed in the present study have been used throughout the province and were specified by the Department of Forests, Mines and Energy. Minor additions have been made to improve their appliction to this particular study area.

Location: The number refers to the map sheet and the pit or deposit on the sheet e.g. 05-13 - map 21-0/5 (Grand River) pit number 13.

Type of Deposit: Four basic types are identified: outwash, ice-contact, alluvium and ablation. These are described in the text.

Status: Active, inactive, or undeveloped. Virtually all the pits in the area are operated on an "as needed" basis and often are unused for many years.

UTM: A six digit Universal Transverse Mercator grid is used to locate each pit within its designated map sheet. The use

of the UTM system is explained on all Canadian 1:50 000 scale topographic maps. The UTM coordinate is considered accurate to within 100 m in each direction. It should be noted that several UTM designations may be possible for large workings which cover significant land areas.

Section Description and Comments: This passage includes the geological and physiographic description of the site. Face heights and compositions are noted and general observations regarding origin of materials, quality, extraction and workability factors. Judgemental comments about the quality or quantity of materials may be present to assist in the evaluation of the deposit's potential. Where D.O.T. data are available these are summarized along with the appropriate D.O.T. "item numbers" (e.g. 78-10). Visual estimates of the overall grain size within available exposures have been included. These percentages are keyed to specific size categories which have an important bearing on the ability to use the material. These data are presented to supplement the detailed laboratory results which assess the smaller size fractions (less than 2.5 cm) and only represent one portion of the deposit.

>10.0 cm - this material requires either removal from the resource or the use of specialized heavy crushing equipment.

10.0 cm to 2.5 cm - the size range of material which may be processed with portable crushing equipment.

2.5 cm to 0.5 cm - gravel which does not necessarily need to be crushed to meet D.O.T. subbase and base course specification.

<0.5 cm - the part of a deposit generally referred to as "sand" by the industry. This is of particular relevance to ready mixed concrete and cement block manufacture. This is approximately equal to the 4.75 mm size range recorded in laboratory data.

fines - the amount of silt and clay material (<75 μm) in the aggregate. These data are normally included as part of the <0.5 cm estimate and are therefore bracketed.

Mechanical analysis: Samples were collected from selected deposits in the study area for sieve analyses. Samples were generally channel samples chosen to be representative of the deposit. In some cases a selected sample was taken to assess the maximum capabilities of the material (these are noted). Samples were dried and sieved. D.O.T. data were chosen to give a maximum, minimum and average value. D.O.T. data are always preceded by the appropriate D.O.T. item number for reference, data with no item numbers are from the present study.

Estimate of Reserves: Areas were calculated using the 1:50 000 topographic maps and an area grid. Thicknesses are based only on observable face heights and are considered minimums. "Limited" is used to describe deposits which appear to have a small amount of material remaining -- often irregularly distributed. These deposits could not support a significant extraction program but may supply small local needs.

SUPPLEMENTARY OBSERVATIONS

Geological features and phenomena which are not strictly related to granular resources are noted as "Supplementary Observations" (Appendix B). Each site is numbered according to the map sheet and a site number (starting at 101 to distinguish them from the deposit numbers). For example: 012-103 occurs on the 21-O/12 sheet (Gounamitz River) and is the third supplementary observation. It describes an interesting geological feature (some potholes in a bedrock outcrop). Many of these sites (e.g. 013-104) are identified as having potential for containing granular materials but which have not been investigated -- primarily due to lack of access or exposure.